JPRS-EST-93-041
16 December 1993

JPRS Report

Science & Technology

Europe/International

Economic Competitiveness

Science & Technology

Europe/International

Economic Competitiveness

JPRS-EST-93-041 *16 December 1993*

CONTENTS

WEST EUROPE

SCIENCE & TECHNOLOGY POLICY

CORPORATE ALLIANCES

CORPORATE STRATEGIES

EAST-WEST RELATIONS

EUROPE-ASIA RELATIONS

SCIENCE & TECHNOLOGY POLICY

France: 1994 Science and Technology Indicators Summarized

BR0612154793 Paris ENSEIGNEMENT SUPERIEUR ET RECHERCHE in French Nov 93 p 9

[Unattributed article: "Science and Technology: 1994 Indicators"]

[Text] The second OST [Science and Technology Observatory] report was handed to Francois Fillon [research minister] in October. It presented a set of indicators describing French scientific and technological activity, its regional components, and the international context. The information contained in the report will contribute to the future debate within the context of the national consultation on the major objectives of French research launched by Francois Fillon.

The report is divided into five parts: France; the regions and economic centers; Europe; the world; and government research in the environment field. Statistical tables and annexes complete the picture. Some key results on France and its regions and economic centers are outlined below.

France: National Financing and Research Performance Structure

Domestic R&D spending for 1990 amounted to about 160 billion French francs (Fr), or 2.4 percent of gross domestic product [GDP]. Private enterprise financed about 46 percent of this and the government 54 percent, of which 19 percent went to defense R&D, 11 percent to civil technology programs (aerospace, nuclear, telecommunications), 13 percent to fundamental research (including university research), and 8.5 percent to scientific and technical support for government policies (health, agriculture...). Two percent of funding came from regional authorities and from the EC Commission.

Over 59 percent of R&D carried out in France was carried out by industrial laboratories; 15.5 percent by academic laboratories (essentially universities and the National Scientific Research Center (CNRS]; 15 percent by government application-oriented research laboratories (INRA [National Agronomic Research Institute], IFREMER [French Research Institute for Exploitation of the Sea], INSERM [National Institute for Health and Medical Research]); nine percent by the military or equivalent; and 1.5 percent by government laboratories located abroad (CERN [European Nuclear Research Center] and ORSTOM [Organization for Overseas Scientific and Technical Research]).

France: Scientific Production

France produced 4.7 percent of the world's scientific publications and 16.8 percent of EC publications (exact sciences only). Its share in this world market increased by 10 percent during the eighties.

France: Private Enterprise

In 1990, some 2,700 companies developed R&D activities involving over 55,000 researchers and research engineers and nearly Fr93 billion. They self-financed about 70 percent of their R&D. France took out 9 percent of European patents (it increases its world share by one percent per year) and 3.6 percent of American patents.

France: Internationalization of Science and Technology

Among EC countries, Germany was France's first scientific partner. About Fr6.5 billion out of the 56.5 which represented French government credits for civil R&D were administered within a European multilateral framework (EC, European Space Agency (ESA), CERN, EUREKA [innovative technologies project]), which corresponded to 11.4 percent.

Regions: Public Research in the Regions

Forty-two percent of public research activities were concentrated in the Ile-de-France [Paris] region, distributed as follows: 38 percent in fundamental research and 45 percent in application- oriented research. This was followed, for public research, by the Rhone-Alpes region (10.1 percent), Pas de Calais (8.2 percent), and Midi-Pyrenees (6.4 percent).

The "Greater Paris Basin" and Massif Central regions accounted for less than two percent each. The geographic distribution of non-university public research has been changing since the mid-eighties: A decline of eight percent in five years was noted for the Ile-de-France region.

Regions: Scientific Publications and Academic Papers

The Ile-de France region produced 44 percent of French scientific publications in exact sciences, followed by Rhone-Alpes (over 10 percent), Pas de Calais (7 percent), and Alsace (5 percent).

About 38 percent of academic papers were produced in the Ile-de- France and 11 percent in the Rhone-Alpes region. Again a decline in the importance of Ile-de-France was noted in this area.

Regions: Industry, R&D, and Patents

Nearly 44 percent of jobs in R&D-intensive ("high-technology") industrial sectors and 55 percent of industrial R&D were located in the Ile-de-France region. Rhone-Alps was the second most important region with nine percent. Ile-de-France invented 45 percent of European patents; Rhone-Alps, 16 percent.

Tasks of the Science and Technology Observatory

Chaired by Pierre Papon, Chief Executive Officer of IFREMER, the task of the Observatory is to produce and disseminate scientific and technological indicators which report on the national system of science and technology within the European and international context. These "national" indicators contribute:

—grounds for the definition of national research policy;

—the national and international framework and contextual elements for research institutions, private enterprise, and major programs.

Another of OST's tasks is to contribute to furthering knowledge on production methodologies for this kind of indicator and to take part in training in this area. In this respect, it welcomes Ph.D. students.

France: CNRS Research Center's 1993-95 Strategy Presented

BR0712100493 Paris ENSEIGNEMENT SUPERIEUR ET RECHERCHE in French Nov 93 p 8

[Unattributed article: "Strategy of the National Center for Scientific Research"]

[Text] Edouard Brezin, president of the CNRS [National Center for Scientific Research] Board of Directors, Francois Kourilsky, managing director, and Jacques Sevin, strategy and programs director, presented the CNRS Research Center's strategy for 1993- 1995 to the press in October.

The strategy has two main objectives: To help fundamental science regain its legitimacy while responding to the challenges posed by society.

This second strategic program will be launched and monitored by the recently set up strategic analysis department managed by Jacques Borde. It will define a certain number of priorities, in particular, those which will give rise to new developments. Interdisciplinarity and the importance given to the regional element in the group's scientific policy are key elements, together with the setting up of partnerships with universities, other research institutes, or companies.

Scientific Strategy

The CNRS research center's strategy is governed by developments in science and by the demands of society. It is based on one major asset: pluridisciplinarity.

1. Scientific Mastering of Complexity.

Recent progress in concepts and scientific tools allow the apprehension of problems while taking into better consideration their real complexity. The need for integration at all levels is one of the key aspects of complexity. The CNRS is planning to have its research in this field cover subjects ranging from molecular systems to human biological systems.

2. Development of Science and Techniques Better Adapted to the Needs of Man.

The CNRS has decided to reintroduce life and social sciences within their technological research programs while relaunching work on the social conditions of science and technology in production. There are three main areas in play: the development of production and communications systems; cognition (intelligent communications and language engineering), and the dynamics of science and techniques. 3. Society's Main Challenges.

The CNRS has placed particular importance on four research sectors concerning society: environmental research; health and aging; the analysis of urbanization; employment and work (the fight against unemployment).

3. Major International Programs in Particle and Space Physics.

The CNRS is participating in a large number of major international programs, mainly in the construction of very large facilities. It actively supports the particle accelerator project in CERN [European Nuclear Research Center], in addition to the VIRGO project, the Chilean very large telescope (VLT) of the European Southern Observatory (ESO). For the VLT, the CNRS strategic plan seeks to give priority to the scientific problems linked to its utilization in the field of space sciences.

4. New Tools, New Technologies.

Two main actions are planned: an increase in the use of mathematics in the different disciplines and the development of new research tools (instruments, computers, and technical know-how).

In addition, the CNRS is seeks to develop consultations with its partners in order to elaborate joint strategies, reinforce partnerships through personalized contracts, reduce the imbalance between the Ile-de-France area and the other regions in terms of laboratories, and develop bilateral and multilateral agreements.

France: Government Council Evaluates Research Policy

BR0712100593 Paris ENSEIGNEMENT SUPERIEUR ET RECHERCHE in French Nov 93 p 6

[Unattributed article: "Council for Research and Technology (CSRT) 1993 Report"]

[Text] The CSRT has just published its annual report for 1993, together with the reports of two working groups on the subjects of Europe and public research.

The report that the CSRT presents each year to Parliament evaluating the national research and development policy gives an account of the work done at the plenary meetings, in the framework of its seven specialist committees and by the two working groups it set up during its current term of office. Five key ideas are brought out in the 1993 report.

Partnership Concept

Research and innovation are today undergoing a deep-rooted transformation with a large increase in the amount of interaction between the various sectors

involved, such as between the R&D "system" and most other socioeconomic sectors of activity, whether health, training, defense, or culture. The CSRT decided to take this new situation into account since it calls into question the significance of certain of the categories used until now and inherited from the old "linear model." The associations brought about by the interaction between disciplines, techniques, and sectors involved in R&D projects have given rise to the creation of a large number of networks and partnerships. As a result, maximum benefit can be drawn from the scientific and technical capacities of public laboratories and private companies.

European Dimension

The CSRT report notes that R&D partnerships are today developing in particular in the two new areas of national R&D policy corresponding to the regional and European dimensions. Its conclusions are based on the report of its expert group on Europe which analyzes the successes and failures of the EC's R&D policy. The CSRT believes that the EC research and development procedures need to be reviewed to give fresh impetus to European activity in this area. It proposes replacing the concept of "precompetitive research" with "cooperative research for the good of the Community." The CSRT claims that such an approach is better suited to the nature and real aims of R&D activity in terms of current socioeconomic requirements, and is more appropriate to the principle of subsidiarity and the aim of coherent action within the EC.

Role of Public Research

For the same reason, the CSRT and its expert group studying public research are examining the decisive role this plays in our country in terms of exchanges and partnerships with its three areas of interaction: training, industry, and society. The transfer of know-how as well as individual mobility are of crucial importance. The relationship between public organizations and their dependents and partners must be altered to meet the new conditions governing R&D activities, combining continuity, adaptability, and flexibility: The conclusion of stated-goal contracts, more management flexibility at the level of institutes, and the use of new contract management methods will enable the development of networks for limited-duration projects that are anchored in solid laboratory structures. However, there must be an evaluation process ensuring the quality and relevance of any action taken in this new context.

Global Coherence of R&D Activity

The many different types of action thus required at the various levels of R&D policy imply that it is more than ever necessary to coordinate this action and ensure its coherence. This is the role of the procedure that France has been using for over 40 years, in various formats, based on the overall planning of government expenditure for civil R&D. The CSRT stresses the importance to this of the civil research and development budget and the solid ministerial structure responsible for research and technology and for coordinating the work of public research establishments.

Social 'Acceptance' of Scientific and Technical Development

Lastly, the scientific and technical development to which this policy contributes concerns society, since it determines the framework of life and lifestyles. Society must therefore assimilate all the ins and outs of progress and the risks involved, shoulder some of the responsibility, and assume its share of the profits and costs. The CSRT stresses the importance of a technical culture accessible to the largest possible number of people. This is also why it attaches particular importance to the consultation processes which must precede the decisionmaking process. Such processes come in various forms: expert and consultancy bodies, the national consultation board being started up in our country, and the European colloquium that the CSRT recommends holding in 1995.

France: National Alliance of Microelectronics R&D Centers

94WS0094B Paris INDUSTRIES ET TECHNIQUES in French 8 Oct 93 p 38

[Article by Ridha Loukil: "French Microtechnology Labs Team Up"; first paragraph is INDUSTRIES ET TECHNIQUES introduction]

[Text] Spurred by LETI (Laboratory for Electronics and Information Technologies), a 1901-law association will bring together the main research teams in the field in France. The golden quadrilateral will stretch between Toulouse, Grenoble, Besancon, and Paris.

The new alliance may be the embryo of a real national plan for microsystems. Spurred by LETI, one of France's top microtechnology players with 70 researchers in the field, the country's main public laboratories are trying to pool their teams in an association governed by 1901 law. The initiative has the blessings of the Research & Space Ministry, the Industry and Foreign Trade Ministry, and the General Weapons Delegation, and should take effect before the end of the year. Though less ambitious than the big Japanese and German programs, the venture aims to make French research in microtechnologies more effective through information exchange, research coordination, and collaborative R&D projects that will be open to manufacturers.

The microsystem concept is a product of the marriage of microelectronics, micromechanics, and microoptics, and is replacing such earlier terms as microtechnologies, micromechanisms, and micromachines. The latter were floated in the eighties to designate complete systems built of basic structures roughly one micrometer in size. Today engineers even talk about nanotechnologies, to describe less-imminent systems based on nanometric structures! The idea behind microsystems is to extend

the technologies used to manufacture electronic chips to sensors and actuators, in order to combine in one component the three classic—and presently separated—functions of a system: sensor, actuator, and processing electronics.

LETI assistant director Philippe Coeure, the moving force behind the association project, says that France boasts a good level of research on microsystems, but ranks fourth internationally behind Japan, the United States, and Germany. Japan is by far the most advanced, with a highly ambitious program (see boxed material). While Germany prepares to start up its second microtechnologies project, the bid invitation issued jointly by the Research & Space Ministry, Industry & Foreign Trade Ministry, General Weapons Delegation, and ANVAR (National Agency for the Application of Research) is deemed minor in scientific circles. According to Philippe Coeure, French microsystem researchers presently have only half the resources of their German counterparts.

The association plan aims to correct this weakness. It extends the experiment launched in 1989 by LETI in Grenoble, LAAS (Laboratory for Automation & Systems Analysis) in Toulouse, and the Marne-la-Vallee ESIEE aimed at grouping together scientists. The Franche-Comte Microtechniques Institute, the Clock Industry Technical Center in Besancon, and the Chemical Microsensors Club in Lyon later joined the group, of which Philippe Coeure is president. It also has several corporate members, including Sagem, Sextant Avionique, Schlumberger, Seb, and the Peugeot-Renault consortium. The group's members would now like to step up their collaboration and capture the ear of French authorities and of Brussels. Instead of scattering their efforts, the three main hubs of microsystem research in France are finally going to coordinate their work to make sure that it is complementary. Better yet, they are going to capitalize on their various strengths: sensors and processing electronics in Grenoble, actuators in Toulouse, and micromechanics in Besancon.

Smart Sensors: A Step Toward Microsystems

Smart sensors are the first step in building microsystems. The devices combine the sensor itself, a mechanical component, and its processing electronics on one chip, producing them both using techniques that are similar to silicon etching. All that is needed to create a microsystem is to add—either monolithically or using a hybrid design—an actuator function fabricated by a process comparable to etching. No cutting-edge technologies are used. The basic idea is to employ robust microelectronics processes to make reliable, low-cost products featuring micron-size patterns. Smart sensors, such as the acceleration meter of the American firm Analog Devices or of LETI, are starting to come out on the market. LETI's combines a pressure sensor and its processing electronics on a chip that measures 1 mm long on one side. Auto manufacturers will use it for air-bag control, active suspension, or the ABS braking system.

A Billion French Francs [Fr] a Year in Japan

Japan's microtechnologies program, funded to the tune of Fr1 billion a year, is one of the three big projects shepharded by MITI. The other two, the ULSI circuit and gallium arsenide programs, have both just ended. The Japanese government and industry will split the cost of the research, which will organized into two, five-year phases. The microtechnologies institute created to perform the studies at the Tsukuba technology park already hosts 60 researchers, 20 from public research institutes and 40 from industry, and a brand new building will house the institute in October, 1994. Japan's 30 biggest companies, including Nippon Steel, Nec, and Toshiba, are participating in the venture, but Hitachi is credited with taking the most active role. Although it is open to foreign investors, the program has only two non-Japanese participants: the U.S. firms IBM and Hewlett-Packard.

In a Nutshell

—France has 70 researchers working on microsystems.

—The goal is to incorporate into one chip sensors, actuators, and processing software, using tools that were developed for microelectronics.

—The French have only half the resources of their German counterparts.

Italy: Research Ministry Signs Accords For Southern Italy

MI2911113393 Turin MEDIA DUEMILA in Italian Oct 93 pp 62-63

[Text] Rome. Four agreements for research to be performed in the South of Italy, for a total value of over 50 billion lire, have been signed by University Education and Research Minister Umberto Colombo with ENEA [National Agency for New Technologies, Energy, and the Environment] and the Gabriele D'Annunzio University in Chieti. The projects will be 60 percent funded by the European Community as part of the STRIDE [Science and Technology for Regional Innovation and Development] program.

The agreement with the University of Chieti (20.6 billion lire) provides for the establishment of the Advanced Biomedical Technologies Institute (ITAB) and was signed by Colombo and university rector Uberto Crescenti. The institute is to specialize in developing new technologies for the noninvasive analysis of bioelectric activity in the human body.

The agreements with ENEA, signed by the minister and ENEA President Nicola Cabibbo, concern three projects worth approximately 32 billion lire. The first, Acitinia (9.2 billion lire), aims at fostering participation by research centers and companies in EC programs. The Cetma project (16.5 billion lire) relates to ENEA initiatives in innovative technologies with the National Consortium for Research into New Materials of Brindisi and

the Trisaia laser station for mechanical machining (in the process of being built). The objective of the Isonova project (6.7 billion lire) is technology transfer to small and medium-sized firms in the South.

European Affairs: JESSI Vice President on Semiconductor Industry

BR0112124193 Paris ELECTRONIQUE INTERNATIONAL HEBDO in French 11 Nov 93 pp 26-27

[Interview with JESSI Vice President Guy Dumas by Jean-Pierre Della Mussia: "The European Semiconductor Can Resume the Offensive"; date, place not given—first paragraph is editorial introduction]

[Text] Guy Dumas, vice president of JESSI [Joint European Submicron Silicon Initiative], thinks that the harmony which currently reigns among semiconductor manufacturers in the framework of this big European program, is an enormous advantage for joint action among the interested parties.

[Della Mussia] The European JESSI program has so far had a bad image. Why?

[Dumas] Too much was probably expected of JESSI immediately. In particular, many people imagined that JESSI would make it possible to bring together Philips, Siemens, and SGS-Thomson, possibly in one entity. This has not happened and would probably not have benefited the earliest products.

It must be admitted that it took time to create a complete climate of confidence among all the industrialists concerned. But this is entirely natural when you know that companies which have not only always been rivals but which are from countries with different cultures and which often bring legacies of unimplemented agreements are now sitting round the same table.

Throughout this period of establishment, JESSI's communication with the media has been very cautious because it had to represent the philosophy of all the protagonists, which was not easy. In addition, we did not have immediately obvious practical results to announce, because it takes years of work before reaching that point. During this time, public money has been spent. That therefore explains why some people hinted that we were "throwing money out of the window." But, believe me, JESSI's management teams have worked hard, have succeeded in setting up a very well-oiled organization, which even some Americans now envy us. Finally, we can now announce major "media" results like the control of European 0.5-micron technology and EPROM [electrically programmable read-only memory] and EEPROM [erasable EPROM] technologies of an international level by SGS-Thomson. This does not mean that we have not obtained other very important results although with less media appeal, for instance in electronic CAD [computer-assisted design]. At all events, I can tell you that the interested parties are very satisfied and that even "base" teams are now proposing transnational projects to their hierarchical superiors.

[Della Mussia] JESSI ends at the end of 1996 in theory. At what technological level will the protagonists then be?

[Dumas] In all likelihood we will master 0.35-micron technologies, with European machines for the manufacture of ASIC's [application-specific integrated circuits] in particular. In addition, the development of 0.25-micron modules will also be well advanced at that time.

[Della Mussia] What is the climate in the cooperation which has been established within JESSI?

[Dumas] After a period of observation, the protagonists of each of the horizontal sectors (production equipment, semiconductors,...) have finally very quickly found methods of cooperation: All know their market and have a common competitor—the Asian companies. This helps people to forget past distrust. Cooperation among sectors, however, has been slower to establish: The interests of the manufacturers of semiconductors, for instance, are not always the same as those of their suppliers; but that is coming, confidence is being established which is very important to ensure that all the links in the chain are strong. At present, in vertical projects, we find, above all, protagonists with "natural affinities," for instance Alcatel and SGS-Thomson. But we are working to ensure that these circles expand. I am also happy to note that, even when participants are not of the same view, they still have confidence to move forward by continuing to talk to each other.

[Della Mussia] What is your attitude toward companies which are not of European origin, like IBM?

[Dumas] It is important to realize that JESSI is organized on the basis of three tiers of partnerships. The tier which actually directs, which makes proposals, and which gives pledges to the public authorities is the JESSI board. It was formed with a concern for a balance among countries (and the total amount of their funding), among sectors (equipment manufacturers, circuit manufacturers, and circuit users), and between industry and research. The JESSI Board includes representatives from Alcatel, Bull, Siemens, Philips, SGS Thomson, ASM International, Bosch, and the Rutherford Appleton Laboratory.

The second tier assesses the technical proposals which come in from all sides. It comprises permanent representatives from 30 companies and institutions, including the eight previous ones, and is subdivided in four "subprogram boards." Proposals made to the JESSI Board by project consortiums are examined by the technical bodies of these subprograms before being presented.

Finally, the third tier comprises the 150 companies currently participating in projects. These companies can make proposals and work in the framework of project consortiums. However, they only take part in the project meetings which concern them; they do not have access to

the more general meetings. To answer your question, our attitude toward foreigners established in Europe is therefore one of openness provided they help JESSI to advance and have laboratories in Europe, but not more than that: The consortiums are free; if three industrialists come together, they can take what partners they wish; having said that, we find it difficult to see, at present, how a Japanese could participate. Funding is not automatic.... Once a project has been approved by the consortiums, the JESSI organization verifies whether it qualifies for funding from the JESSI budget.

[Della Mussia] What are your relations with Sematech, the American equivalent to JESSI?

[Dumas] The launch of our cooperation has been slow, but we now have sustained relations although limited to very specific areas: "mini-environments" (SMIF [standard mechanical interface]...), masks, mask materials and metrology, and phase shift masks. In this specific context, a good climate has been established, which enables us to decide quickly. We hope in future to extend the areas of collaboration. But Sematech's goal is not the development of semiconductor technology. We therefore cannot at present cooperate with the Americans beyond the existing area, other than company by company.

[Della Mussia] Do the Germans have as much faith in JESSI as the French? Why do they say that JESSI will end in 1996?

[Dumas] The Germans are rigorous. JESSI is a plan running until 1996. They therefore have no hesitation in saying that. For them, a follow-up to JESSI is in the realm of possibilities, no more than that. But I assure you that there is no separate German stance in JESSI.

[Della Mussia] Will this plan be continued further?

[Dumas] It is the partners on the JESSI Board who may possibly propose that to the governments concerned according to the results achieved. We must not forget, however, that JESSI is not a program requested by the public authorities. It is a program proposed and managed by industrialists who, moreover, provide half of its funding.

[Della Mussia] How is JESSI's budget developing?

[Dumas] It is stable. In total in 1994, France and Germany will each contribute a little more than 100 million European Currency Units [ECU] to the total expenditure budget (as in 1993), and the EC Commission a little more than ECU 130 million (slightly up on 1993). Italy and Holland together will contribute approximately as much as France.

Spending and funding for 1994 are therefore clear. We are now in a project-by-project discussion phase with the public authorities and, also, within the JESSI organization.

For 1995, we will see what happens. In particular, we cannot gauge the impact on JESSI of the end of the EC Commission's ESPRIT-III [European Strategic Program for Research and Development in Information Technologies] program in the second quarter of 1995.

[Della Mussia] What are the links between JESSI and the other European programs?

[Dumas] ESPRIT is a research program. It is therefore positioned "upstream" of JESSI on the research-to-market scale. Some large JESSI projects are funded by ESPRIT. Otherwise, we have no link with the other programs. But the industrialists taking part in JESSI do have such links, for instance, with RACE [Research in Advanced Communications for Europe] projects.

JESSI: Organization by Subprograms

The JESSI program consists of five subprograms which in turn are subdivided in a number of "clusters," each of the latter containing several projects.

1. "Technologies" Subprogram

This subprogram covers three clusters: the manufacture of competitive CMOS [complementary metal-oxide semiconductor] circuits; 0.5-micron logic CMOS circuits; and packaging.

The "manufacture of competitive CMOS" cluster is the most important of all. It covers in particular projects for mass-produced memories (IBM/Siemens, SGS Thomson); studies on 200-mm wafers (IBM/SGS Thomson); and, above all, projects on manufacturing sciences and technologies. All European semiconductor manufacturers are taking part in it with coordination provided by Siemens.

The "0.5-micron logic CMOS circuits" cluster is another very important cluster supported by the EC Commission in the context of ESPRIT. All European integrated circuit manufacturers are taking part in it. It is this cluster which has led to a European design standard for 0.5-micron circuits being available to users.

The "packaging" cluster covers a silicon-based MCM [multichip module] project and a project on the packaging technology of the future.

2. "Applications and CAD" Subprogram

This subprogram has five clusters: automobile security; broadband communications; digital radio; high-definition television (HDTV); and mobile phones.

The "automobile security" cluster is very much geared to dedicated microprocessors and software.

The "broadband communications" cluster is associated with a CAD tools program to design an ATM [asynchronous transfer mode] card (Bull and Alcatel).

The HDMAC project conducted under the "HDTV" cluster has been halted. Philips and TCE [Thomson Consumer Electronics] are to start again on a project for digital TV circuits (aside from transmission).

The "mobile phones" cluster contains two GSM [Global System for Mobile Communications] projects, one carried out by Alcatel/SGS- Thomson, the other by Philips, both very different in concept. An analog simulation project is linked with this cluster.

3. "Equipment and Materials" Subprogram

This subprogram consists of seven clusters: lithography; clean gases; pure chemistry; etching, deposition; silicon materials; mini- environments; and testing equipment.

ASM Lithographie is leading the "lithography" cluster.

ASM International is leading the "etching, deposition" cluster.

One of the two projects in the "testing equipment" cluster led to the development of an original mixed digital-to-analog tester by Schlumberger.

4. "0.25-Micron Basic Research" Subprogram

There are no clusters in this subprogram, which brings together GRESSI [Grenoble Submicron Silicon, France], IMEC [Interuniversity Microelectronics Institute, Belgium], and the Fraunhofer Institute [Germany]. It is responsible for all technologies below 0.35 micron (0.25 and 0.18 micron) and for the corresponding simulation tools.

5. "Isolated Projects" Subprogram

No clusters in this subprogram, which includes four CAD tool projects and one ASIC training project for small and medium-sized enterprises and research institutes.

Germany: Institute for Nonlinear Optics Established in Berlin

MI0112133893 Bonn TECHNOLOGIE-NACHRICHTEN MANAGEMENT-INFORMATIONEN in German 28 Oct 93 p 10

[Text] The Max Born Institute of Nonlinear Optics and Pulsed [Kurzzeit-] Spectroscopy (MBI) in Berlin was officially opened on 22 October. As the successor to the former GDR Academy of Sciences' Central Institute of Optics and Spectroscopy (ZOS), it is now one of the "Blue List" institutes, drawing half its financing from the BMFT [Federal Ministry of Research and Technology] and half from the Land of Berlin (budget for 1993: 22.3 million German marks [DM]). A staff of 180 is currently working at the MBI on basic and applied laser research and engineering topics such as diode lasers, laser medicine, and laser biodynamics. Three promising new major research areas not previously present in this form and along these lines in the Federal Republic have been identified in three closely interrelated sections, namely laser spectroscopy on clusters and interfaces, strong laser fields and excited states, and nonlinear processes in condensed matter.

In terms of staffing and technical equiopment, the MBI is one of the largest laser research institutes in the Federal Republic of Germany. The most prominent features of the MBI's research profile as an institute of fundamental importance for laser spectroscopy research are interdisciplinary applications to nanomaterials, optoelectrics, photonics, and laser biodynamics. The scientific capacity available in the ZOS has been formed the core in the creation of a facility that represents a true enhancement of the federal German research scene. Three renowned scientists, professors Hertel, Sandner, and Elsaesser, have been brought in to head the institute's three divisions.

Although the MBI's scientific structure has been built up to a largely satisfactory level, considerable conversion and restoration work still remains to be done on the buildings as such. The BMFT and the Land of Berlin are earmarking DM43 million for this purpose over the next four years.

Germany: Pharmaceutical Industry Takes Research Abroad

MI0112134393 Munich SUEDDEUTSCHE ZEITUNG in German 4 Nov 93 p 36

[Interview with Dr. Frank Morich, Head of Pharmaceutical Research with Bayer, Leverkusen, by Martin Urban, place not specified: "Is Research Emigrating?"]

[Text] [Urban] Is there a trend in the pharmaceutical industry toward taking research abroad?

[Morich] There is at Bayer, though only for new projects, but this has nothing to do with the current situation in the federal republic.

[Urban] Why have you turned to the United States?

[Morich] America is the biggest pharmaceuticals market in the world, and its sheer size makes it the most important country for our clinical tests. The United States is also the cradle of genetic engineering and molecular biology. Generally speaking, there is a more positive attitude toward technology there, and unlike in Germany, it is regarded as a source of hope. It is of major importance for us to achieve a seamless transition from research to production in genetic engineering.

[Urban] Would it not be possible to keep research in Germany and go into production abroad?

[Morich] The two have to go hand in hand. We cannot handle initial preclinical trials from the other side of the Atlantic.

[Urban] The policy-makers drew the consequences from objections voiced by the industry in the amended law on genetic engineering. Nevertheless, the licensing procedure for high-risk experiments in the United states is no less strict than the procedure that will remain in force in

Germany. There is unlikely to be a change of mind. Does this now mean that the genetic research train has now left for the United States?

[Morich] No, although we have decided to open up our facilities in the United States, to be more precise in Berkley, for genetic engineering products obtained from animal cell cultures. We nevertheless continue to regard ourselves as a company with a strong research base in Germany.

[Urban] You have also gone to Japan, and indeed you are carrying out allergy research there. Why is that?

[Morich] The reason was that we wanted a research presence there as well. We have a relatively large share of the market in Japan, which has recently been making a considerable contribution to drug research. We work on the principle of going wherever the best brains are.

[Urban] You have begun cancer research in the United States. Now, it cannot be said that tumor research has a bad reputation in Germany: quite the contrary. Could you not have found brains as good as the ones available in the United States here as well?

[Morich] What we are primarily looking for is being pursued by a few American universities and smallish biotechnology firms. That is where the greatest know-how is to be found in this very specific case, and it is why we are seeking a collaboration there.

[Urban] Other companies will probably be motivated by considerations of this type as well.

[Morich] Yes, on the whole I believe that the research-led pharmaceutical industry takes a very critical view of Germany as a location.

[Urban] The result is that young scientists fresh out of university in the Federal Republic cannot find jobs in research. They are lost to science, even if jobs turn up again in a few years' time.

[Morich] This will have terrible consequences. We are still recruiting, but whole age-groups of graduates are missing from the chemical industry in general. In my opinion, it is up to research policy to safeguard leading-edge research. Research must move back into the center of public interest. As I have already mentioned, public opinion in the United States takes a much more optimistic attitude to this type of research than is the case in Germany.

[Urban] In the meantime, the public's attitude to genetic engineering in the Federal Republic is much more differentiated than it was a few years ago. Surveys by the Bundestag's Science Service show that there are very few objections to using genetic engineering in medicine. On the other hand, great reservations are expressed as regards novel foods produced by genetic engineering processes.

[Morich] We cannot say that one aspect of genetic engineering is good and the other bad. We still do not know how dangerous it will be to use genetic engineering to treat patients suffering from inherited illnesses. It has to be generally accepted that research inevitably entails certain risks.

[Urban] What it boils down to is minimizing the risks. Strict conditions can generate innovation in research as well. For instance, the criticisms voiced by the opponents of animal testing have undoubtedly speeded up the development of cell culture tests and other processes.

[Morich] I admit that apprehensions of this type also have an innovative element, although we already do without animals whenever we can as it is. However, it should be publicly acknowledged that animal experiments are useful to mankind and are often a simple necessity.

Germany: Innovative R&D Needed To Face Overseas Competition

MI0112134693 Bonn DIE WELT in German 10 Nov 93 p 13

[Article by Hans-Juergen Mahnke: "More Money for Research Funding: Innovation Offensive Called For—German High-Tech Firms Rank Second Worldwide"]

[Text] Germany needs to launch an innovation offensive. This was the message that Federal Research Minister Paul Krueger delivered yesterday when presenting a survey of the technological competitiveness of German industry conducted by his ministry. The research budget will therefore probably be topped up by more than 100 million German marks next year, the additional funds going primarily to eastern Germany.

The economic boom of the eighties had largely been created by research-intensive branches of industry, sectors that spent more than 3.5 percent of their sales income on research and development, he said. This trend had not continued in the nineties, although research-intensive sectors still accounted for nearly 46 percent of the net industrial product and over 48 percent of German exports.

It was also worth noting that high-tech manufacturers had considerably increased their share of German exports in 1992, said Krueger. Germany's share of the world market had also grown: With 11.5 percent of world trade, Germany ranked second behind the United States (12 percent) and ahead of Japan (9.1 percent).

Germany was also one of the few industrialized countries represented on the world high-tech goods market with an almost complete range of competitive products. However, Germany was falling behind in microelectronics, especially in computer manufacturing.

The unsatisfactory situation prevailing in the research-intensive sectors was due to the loss of innovation

momentum: Compared with Japan and the United States, the number of German patent applications showed only below-average growth. German high-technology exports had lost ground, especially in markets holding out future promise, and the Germans were concentrating instead on their traditional areas of strength.

Many German firms owed their success primarily to the fact that they led the world as suppliers of complete, integrated systems incorporating various technologies. This meant, for instance, that software was becoming an increasingly important factor in the competitiveness of German products.

UK: External Organizations Consulted on Future S&T Programs

BR0212151893 London Hermes Database in English 12 Nov 93

[UK Press Release from the Office of Public Service and Science: "Forward Look of Government-Funded Science & Technology"]

[Text]

Consultation With External Organisations

The Government is consulting a number of external organisations in preparation for its 1994 Forward Look of publicly-funded science and technology.

Consultation with the science, engineering and technology communities and with the wider industrial, commercial and academic communities played an important part in the preparation of the recent Science Engineering and Technology White Paper. The Government is keen to continue the process and to benefit from external advice and guidance in preparing the Forward Look.

The independent advice of the new Council for Science and Technology will be sought on the future direction, balance and content of the Government's science and technology programmes.

In addition, over the next two months, the Office of Science and Technology (OST) will seek the views of a number of organisations outside Government. Advice will be sought on the changing social, economic, international and scientific environments against which the 1994 Forward Look should be set.

Government Departments and the Research Councils will also contribute assessments of future needs to the Forward Look. In doing so they will take account of the views of those with an interest in the outputs of their research and training programmes, especially in industry.

Note for Editors

The White Paper "Realising our Potential: a Strategy for Science, Engineering and Technology" (Cm [Chairman's Memorandum] 2250) announced that the Government would publish each year a Forward Look of publicly funded science and technology. The Forward Look is intended to give the industrial and RESEARCH communities a clear and up-to-date statement of the strategy for Government-funded science and technology over a five to ten year perspective. The first Forward Look will be published in April 1994. Issued by: Press Office; Office of Public Service and Science; Cabinet Office; 70 Whitehall; London; SW1A 2AS; Tel: 071 270 0393/0207; Out of hours tel 0399 1133 and ask for pager number 721338

Germany: Minister Krueger Views Research, High Speed Train Project

AU0312173793 Berlin DIE WELT in German 3 Dec 93 pp 1, 13

[Hans-Juergen Mahnke report: "Minister Krueger tells WELT: 'The Transrapid Is Coming'"]

[Text] Research Minister Paul Krueger of the Christian Democratic Union has told DIE WELT that "the Transrapid is coming." An agreement with business circles is imminent.

The Transrapid is a high-speed (400 km per hour) magnetic levitation railroad that will operate between Berlin and Hamburg. Long stretches of the track will have to built on pylons. The Research Ministry has already invested 1.8 billion German marks [DM] in a pilot project in Emsland.

The costs of the new project have been estimated at around DM9 billion.

Originally, industry was to bear all the costs. Now, Thyssen, Siemens, AEG, Lufthansa, and Deutsche Bahn AG will only be financing the actual operation of the railroad. The government is considering financing the construction of the track with funds that would otherwise have to be spent on a planned inter-city express service between Berlin and Hamburg.

German industry must, according to Paul Krueger, start pursuing research once again. There are good reasons why industry's share of expenditure on research has declined from 62 percent to 58 percent. In Japan, for example, 80 percent of research expenditure is financed by the private sector. "We must formulate a new approach," stressed Krueger in a conversation with DIE WELT. Immediately after he assumed office in May, he formed a strategy group made up of prominent representatives of the scientific, economic, and political communities.

It was primarily a question of changing the laws—he specifically mentioned those on genetic technology, animal protection, and chemicals—so that innovation would not be hindered. In addition, it was also a matter of a sustained improvement in the public climate for research.

A positive attitude must be fostered toward research. The risks should not be swept under the carpet. In addition, it is also a question of turning new ideas into products. "We have excellent basic research," but there are problems with using it to create new products.

He does not want to make economies on space flight. Unmanned space flight is increasingly developing in a direction that is commercially viable. Larger-scale projects cannot, however, be financed by a country acting alone. In this regard, Krueger is counting on cooperation with the United States and the Russians.

Krueger is "by and large" pleased with his ministry's budget levels. It is true that they were not raised, but during the budget consultations, the ministry nevertheless received DM150 million for activities in eastern Germany. Krueger hopes that industrial research will be speeded up as a result. That is because only 1.9 percent of exports come from eastern Germany.

Nevertheless, a Sword of Damocles in the form of a DM5-billion reduction in the federal budget hangs over his budget. He hopes that his ministry will not be greatly affected. Even if he does not have to come up with the money for Transrapid, he will hardly have much room for maneuver. An additional DM50 million must be made available for ancillary research annually. In addition, transportation research will be one area that the ministry will be concentrating on.

Germany: SPD Opposes Juelich Nuclear Research Center Budget Cuts

MI2311142493 Bonn TECHNOLOGIE-NACHRICHTEN MANAGEMENT-INFORMATIONEN in German 15 Oct 93 pp 2-3

[Text] SPD [Social Democratic Party of Germany] parliamentary party research spokesman Josef Vosen has described the budget that the Federal Government, via the BMFT [Federal Ministry of Research and Technology], plans to allow the KFA, the Juelich Nuclear Research Center, as an attempt on the life of the renowned research facility and its ability to carry out its work.

In 1992, the Federal Government, as 90 percent owner of the facility, paid out 445.4 million German marks [DM] as its share of institutional funding, and even this sum meant that the KFA had to make structural savings in its establishment plan. Indeed, the Federal Government had paid DM454.8 million in 1992, so 1992 already showed a nominal two percent cut, although, as everyone knows, inflation and rising costs would actually have necessitated a nominal increase of 4 to 5 percent, so the real cut was much higher than 2.5 percent.

In the light of past history, the DM452.2-million appropriation for the current year, 1993, which thus represents a nominal 1.5 percent increase, will again be inadequate because inflation and rising costs turn it into another cut in real terms and compound the loss in funding.

However, present plans for 1994 can only be described as scandalous and as an attempt by the CDU/CSU [Christian Democratic Union/Christian Socialist Union] and FDP [Free Democratic Party of Germany] coalition in Bonn to strangle the Juelich Nuclear Research Center and the Dueren-Juelich area.

The KFA will have to manage with a DM432-million federal grant, a 4.5 percent nominal cut, which is closer to at least 10 percent in real terms.

When a whole research center employing a staff of 5,000 and performing exceptional work is faced out of the blue with the prospect of such drastic cuts, it cannot carry on with its work as if nothing had happened.

Research and technology funding must be consistent and reliable, but this principle is now being trampled underfoot.

The accounting behind the DM407.8 million indicated in the budget itself (- 9.8 percent) is as follows:

—The Federal Government is withholding from the Juelich budget DM35 million in financing for disposal of the atomic test reactor and has created a new item of financing in the federal budget for problems of this type faced by all research centers with obsolete nuclear plants. However, it intends to pay Juelich only DM25 million out of this fund for the abovementioned work, so the KFA will have to make up the remaining DM10 million out of its own resources.

—The Federal Government is also cutting the appropriation needed for current and planned investments by DM4 million without explanation.

—It is also forcing the Juelich center to make general savings in its operating budget—wages, salaries, etc.—for a further DM6 million or so.

As matters currently stand, Juelich will thus receive DM432 million at the very most: A sum too low for the research center to live on, but not low enough to kill it off.

Vosen says he is sure that the co-owner, the Land of North Rhine- Westphalia, cannot and will not accept this, and he calls on the Federal Government to provide the Juelich Research Center with the funding that it needs.

The SPD parliamentary party will accordingly press for its funding to be topped up during the debate on the 1994 budget.

Germany: KFA's Research Priorities Outlined

MI1211142193 Juelich KFA INTERN (KFA ANNUAL REPORT supplement) in German Oct 93 pp 79-85

[Text] The Juelich Research Center (KFA), one of the Federal Republic of Germany's 16 Major Research Institutes, is a multidisciplinary research facility that works on a wide range of topical subjects and research projects of particular public interest, contributing both to long-term programs and to preventive research and key technologies. It is this interdisciplinary approach, transcending the bounds of individual research fields, that is the fundamental idea behind the KFA's working methods. The KFA does not work in isolation, but cultivates close working relations with the universities, other nonuniversity research facilities, and industry—for instance, in the form of joint projects.

In the past, it covered seven main research fields, but since the beginning of 1993, the KFA's research and development schedule comprises the following five broad programs:

—structure of matter and materials research;

—information technology;

—life sciences;

—environment protection research; and

—power engineering.

These five new research programs will project a clearer research profile for the KFA. At the same time, it is important to bear the links between the individual programs in mind: For instance, an advance in power engineering or information technology cannot be made nowadays without basic materials research. The same goes for the life sciences, and medical research in particular, which take advantage of modern information technology. In power engineering, too, the pursuit of new technologies should always take account of their environmental impact.

The KFA thus makes a recognizable contribution to national and international research. In 1992 it generated 1,531 scientific publications; in addition, 2,294 lectures were given, 76 patents, including foreign patents, were granted, 85 patent applications were filed, and 238 internal reports were drawn up.

Research and development work commissioned by industry, in which the KFA makes use of its special know-how, shows a definite increase. Particular attention is devoted to technology transfer at the national and, above all, regional, levels, and the KFA is also managing major cooperation and training programs in several developing countries. It assists the state, acting in an advisory capacity with regard to nuclear safety and environment protection in general, and performing analytical surveys, particularly on technological development trends.

The KFA handles major Federal Government funding programs as a project manager, particularly in biology, energy and ecology, materials and raw materials research, and the study of condensed matter and new technologies in the humanities.

Structure of Matter and Materials Research

The structure of matter and materials research program covers a wide range of topics, from basic nuclear and solid-state physics research to applied materials research and development.

Nuclear physics centers on the newly installed COSY, or Juelich cooler synchrotron, a storage ring for ion radiation, and in particular for protons. Synchrotron acceleration makes it possible to achieve 2.5-GeV (billion electronvolts) final proton energy (initial energy in the storage ring: 40 million electronvolts). COSY Juelich is unique among proton storage rings with cooling systems already existing or currently being built in its excellent beam quality (high beam current density), its energy variation range, and the third-party use made of the radiation. German universities are participating extensively in the planned experimental program that sets out to discover more about the quark structure of nuclei in nuclear reactions and scattering processes. Future users have thus joined forces in the COSY Association of North Rhine-Westphalian Universities (CANU), to which other interested universities also belong.

Solid-state research is undertaken to achieve a fundamental understanding of the microscopic properties of condensed matter by throwing light on its atomic and electronic structure and correlating the latter to microscopic material properties. Its predominant features are that theory and experiment go hand in hand, that a constant effort is needed to develop and apply modern investigative methods, and that the preparation and characterization of the substances under study is particularly demanding. Basic research of this kind is indispensable for future high-technology applications. The work may be divided into the following categories of research:

—Phenomenon-oriented research, which aims to elucidate universal laws of condensed matter, primarily using model substances, the description of the nonlinear dynamic processes involved in the formation of solid structures being of particular importance.

—Material-oriented research, which sets out to discover new model substances for the phenomenon-oriented work and to produce, characterize, and exploit materials, alloys, and layered structures of potential industrial interest. The production of high-temperature superconductors and layered systems, with particular reference to information technology applications, is one of the priorities.

—Method-oriented research, the purpose of which is to develop and improve experimental and theoretical

methods, particularly for applications used in conjunction with large-scale facilities such as neutron and synchrotron radiation sources.

The KFA, as is typical for a major research institute, operates the FRJ-2 [research reactor Juelich 2], which is still the most powerful neutron source in Germany. The reactor is put to a wide variety of uses by external facilities, primarily German universities. Since the end of 1988, the KFA has also been the German member of the European Synchrotron Radiation Foundation (ESRF) in Grenoble.

A close relation of solid-state research is surface and interface research, which elaborates and consolidates a basic understanding of the processes that occur on the surfaces and interfaces of solid bodies. The main focus is on research into the structure, dynamics, elementary excitation, and electronic properties of surfaces and interfaces, with particular emphasis on studies of material systems specially prepared in ultrahigh vacuum conditions. This research is overwhelmingly directed toward solving specific problems encountered in information technology (with particular reference to thin films and coating systems), catalysis, material processing, and the plasma-wall interaction. This latter topic is closely bound up with fusion research and the associated materials research carried out at the KFA. Components for vacuum and clean-room engineering (e.g., magnetic bearing and drive designs) for high-technology applications are also being developed in close cooperation with partners in industry.

The KFA's materials research program is extending solid-state and surface research in the direction of commercially exploitable materials. This work is closely associated with the power engineering research program and stems from the need to find materials for advanced, environment-friendly power engineering solutions. The high-temperature materials and structural ceramics program comprises the following main topics:

—Electrochemical energy converters with particular reference to fuel cells;

—Material behavior in the plasma-wall interaction in fusion reactors; and

—Components for environment-friendly, high-efficiency thermal power stations.

The close interplay between the elaboration of microstructures and properties and the use of these findings to analyze material and component behavior and to improve production technique parameters is of decisive importance and is fostered by the KFA's special know-how and test equipment for developing metallic and ceramic materials and composites [withstanding] over 500 degrees Celsius.

Information Technology

Over recent decades, information technology has come to symbolize the epitome of modern technology, with applications that have entered most spheres of life, fundamentally changing many of them. Microelectronics in particular constitutes a major economic factor, but supercomputers too have found their way into many areas of industry, as they obviate the need for extremely complex or practically unfeasible experimental analyses. The KFA takes account of this development in its information technology research program, which comprises both basic information technology research and data processing, mathematics, and electronics.

The motive force behind the basic information technology research program lies in the development of new devices using semiconductive and superconductive materials and hybrids of the two. The work undertaken to achieve this central goal ranges from basic research to technology development, the topics comprising new devices, superconductive and semiconductive coatings, metallization, magnetic coatings for information storage media, and III-V single crystals. This work is carried out in close contact with the solid-state and surface and interface research programs. Semiconductor electronics research focuses mainly on new nonconventional silicon and III-V devices, for example "vertical" field-effect transistors with a permeable base. Other ideas for new devices are based on the extremely high charge carrier concentrations found in III-V heterostructures. Work on superconductor devices primarily addresses the fabrication, characterization, and optimization of Josephson contacts and their application in selected circuits. Both conventional and "high-temperature" superconductors—the latter being materials that present superconducting properties at temperatures as high as that of liquid nitrogen (minus 196 degrees Celsius)—are being used for this purpose. These Josephson contacts are used in high-frequency applications (oscillators, switches, level converters) and in superconducting quantum interference detectors (SQUID's), in which field the KFA has acquired a leading position worldwide. A particular success was scored when it used nitrogen-cooled SQUID's to make the first-ever recording of magnetic signals emitted by human brain activity. It is now endeavoring to achieve further improvements in sensitivity and user-friendliness for medical applications.

The data processing, mathematics, and electronics section comprises the creation and enhancement of hardware and software in all areas of data processing, the development of numerical methods and algorithms, and pivotal research and development work in electronics, data processing, and mathematics. In the wider sense, this field also covers scientific supercomputing, which has many applications in the natural and engineering sciences. The KFA is one of the leading supercomputing centers in Europe, operating two Cray YMP supercomputers, one of which, the YMP/832 is used as a production computer for the Supercomputing Center (HLRZ), a

joint DESY (German Electron Synchrotron, in Hamburg), GMD (Society for Mathematics and Data Processing, in St. Augustin), and KFA facility. The KFA has also recently gone into massively parallel computing with the installation of an Intel Paragon system.

Life Sciences

The life sciences research program comprises work ranging from medical research to biological information processing and biotechnology.

The goal of the medical research and engineering program is to extend knowledge of the molecular principles on which human life processes are based, in vivo at the subcellular, cellular, and intercellular levels. The work is performed in such a way as to allow measurements in the intact complex of human cells and organs while preserving the intricate inter and intracellular control loops that cannot usually be maintained during conventional biochemical tests. It uses radioactively labeled atoms or molecules, which are inserted into the molecular network of an organism as tracers and which supply information, through their behavior, on subcellular, cellular, and intercellular molecular processes in an authentic environment. Nuclear spin tomography and magnetoencephalography will also be used. The program will thus add to the picture of the human being formed by the life sciences, extend the range of methods for diagnosing human diseases, and increase opportunities for targeted molecular therapy at an early stage. The focus is on brain and heart research and tumor therapy.

Radiation and nuclear chemistry research work focuses overwhelmingly on medical issues, with the development of radium-based drugs [Radiopharmaka] for applications in medical function diagnostics and pharmacology. To this end, short-lived radionuclides are being generated, fast molecular labeling and quality control methods are being developed, and the labeled molecules (tracers) evaluated in radiobiochemical examinations. The purpose of the work is to make tracers accessible to medicine for emission tomography, thus making early diagnosis of malfunctions possible without surgery.

The goal pursued in biotechnology at the KFA is to develop biotechnological methods for processing natural and man-made raw materials, the emphasis being on enzymatic and microbial amino acid preparation, the use of anaerobic bacteria to produce fermentation products of commercial interest from sacchariferous residues, and the anaerobic purification of highly polluted effluent. Other priority topics are the preparation of high-performance microorganisms and the development of suitable bioreactors.

Work in the biological information processing sector focuses on the processing of chemical and physical stimuli in cells (cellular signal processing). It forms part of biological and medical basic research, and it is expected to contribute to the development of commercial information processing systems based on biological structures and biopolymers. The research work centers around studies that set out to elucidate the signal processing mechanisms in various cellular systems, and particularly in photoreceptors, olfactory cells, germ cells, and bacteria. In addition to these systems, in which the stimulus is applied to the cell from outside, there are signals that determine how substances are transported between the various compartments of a eukariotic cell. The structural aspects of the distribution of newly synthesized integral membrane proteins among the destination points in the various organelle membranes are also being studied.

Environment Protection Research

Environmental conservation is one of the major tasks of our time, and contributing to it is the primary goal of the interdisciplinary work undertaken in the environment protection research program, which embraces a wide range of basic, applied, and systems analysis work. The results achieved in this research are making a substantial contribution to knowledge of how naturally occurring and anthropogenic environmental chemicals behave in and affect the atmosphere, the biosphere, the hydrosphere, and the pedosphere. In future, research in this field will focus to a greater extent on the detection of interactions between the individual compartments, their quantitative description, and the conclusions that may be drawn therefrom for environment management purposes. Much of this research work is integrated into wider programs sponsored by the land, the Federal Government, and the European Community. The KFA is a member of the AGF [Association of Major Research Institutes] Environment Protection Research Federation (consisting of the AWI [Alfred Wegener Polar and Marine Research Institute], DLR [German Aerospace Research Institute], GBF [Biotechnology Research Society], GKSS [Society for the Exploitation of Nuclear Power in Shipbuilding and Shipping], GSF [Radiation and Environment Research Society], KFA, KfK [Karlsruhe Nuclear Research Center], and UFZ [Environment Research Center]). The federation's members work together in this area by combining their R&D under selected programs and projects with a common purpose. This research field comprises the environment research and systems analysis divisions.

The environment research division in turn comprises four areas:

—chemistry of the air;

—environmental chemicals in the geo- and biospheres;

—environmental chemicals in water and effluent; and

—environment monitoring and protection.

Research into the chemistry of the air involves special studies of the oxidation capacity of the troposphere, the radical photochemical reactions that take place there, and the extent to which they are influenced by anthropogenic emissions, particularly hydrocarbons and nitrogen oxides. The chemical and physical processes

that maintain the ozone balance in the stratosphere are also being studied. These air chemistry projects are making a major contribution to knowledge of the distribution in space and time of climate-relevant trace gases and their atmospheric cycles. Paleotemperature studies in high time resolution are also being carried out on terrestrial deposits.

Work on environmental chemicals in the geo and biospheres sets out to record flows of environment-relevant substances in the air, vegetation, soil, and groundwater system, to understand the principles on which they are based, and to use the knowledge thus obtained for prognosis models and for practical soil protection. Selected agrochemicals, airborne organic pollutants and those discharged into the soil, heavy metals and radionuclides, and reactive nitrogen compounds are being studied. The open-air field trials on pesticide recovery are worth mentioning in this connection.

The main purpose of work on environmental chemicals in water and effluent is to throw light on the ecophysiological and population-dynamic aspects of the microbial oxidation of ammonia and nitrite. The findings will be used to develop strategies for and assess effluent purification processes. With this end in view, trials with model sewage treatment plants, pure cultures, and defined hybrid cultures are being performed over the periods of time that they would typically spend in a sewage treatment plant in order to determine the decisive energy requirement for survival metabolism during artificially induced nitrification. The results are verified on an industrial scale. Studies of model marsh plant vegetations are being undertaken with a view to managing the lakes that form in disused quarries and moist biotopes. Interfacial chemistry methods, too, are being applied in the removal of heavy metals from effluent flows by the reactive liquid-liquid extraction method, which sets out to recover as much useful material as possible by the systematic exploitation of phenomena occurring in physical chemistry.

Contributions to the operation of the Environment Sample Bank provided by the environment monitoring and protection work focus directly on the study of past and present environmental pollution in the Federal Republic. The Environment Sample Bank of the Federal Republic of Germany is a unique archive of regularly collected and safely stored specimens from many different representative sampling areas, the underlying aim being to detect and trace the history of long-term modifications in chemical substances in the environment in time and space. Other projects are developing monitoring programs and studying ways of reducing, interpreting, and forecasting environmental pollution. In addition to scientific analyses, this work also takes account of social, economic, and political factors and interactions.

The systems analysis section studies power supply issues, the economic, ecological, and political impact of technology, and technology assessment from a systems-analysis and sociological point of view. The results are used both in the pursuit of scientific goals and in the provision of information and advice to the Bundestag, the ministries, and other national and international bodies.

Power Engineering

Work in the power engineering field is directed toward achieving environment-friendly, resource-saving energy systems and embraces the following topics: energy conversion methods, fossil fuel prospecting and extraction, safety research, reactor engineering and nuclear waste disposal, and nuclear fusion.

Energy conversion methods are needed to develop processes and equipment for exploiting secondary energy sources, primarily with a view to reducing environmental pollution as far as possible by minimizing the discharge of pollutants during conversion processes. The program comprises the following main areas: fuel cell development, electrochemical energy storage media and water electrolysis, catalytic combustion, and photovoltaics. The main work focuses on high-temperature fuel cells with stabilized zircon dioxide as the solid electrolyte, otherwise known as solid oxide fuel cells (SOFC's), the main goal being to develop, build, and test a complete high-temperature fuel cell with methane reforming. Complementary research work is being carried out on low-temperature fuel cells with methane reforming and on electrochemical storage media. The catalytic combustion concept, the low-pollution, flameless combustion of liquid and gaseous fuels at low temperatures, is also being pursued, particularly for heating purposes.

If the potential of photovoltaics is to be exploited, it is essential to raise the efficiency level of solar cells and to lower production costs. The KFA is a member of the Solar Energy Research Federation (DLR, HMI [Hahn-Meitner Nuclear Research Institute], FhG [Fraunhofer Society], ISET, KFA, ZSW [Hydrogen Research Center), the purpose of which is to foster intensive research into solar power and the associated systems engineering. The KFA is also involved in the project funded by the Land of North Rhine-Westphalia and implemented at the KFA itself to "Build and Operate a Pilot Photovoltaic Hydrogen Fuel Cell Plant" (KFA, ZfS Hilden, and Hagen, Duisburg, and Essen Universities).

Since the fuel crisis at the beginning of the seventies, the KFA has been carrying out research work on fossil fuel prospecting and extraction as a contribution toward securing oil and natural gas supplies for the Federal Republic of Germany. This work covers both prospecting-relevant aspects of the formation, migration, and accumulation of hydrocarbons and basic research into the formation and dynamics of sedimentation basins, the development of organic geochemical analysis methods

and the use of computers to simulate geologically significant processes playing a major role. A number of the processes and findings arrived at can be used directly to study and solve environmental problems.

The safety research, reactor engineering, and nuclear waste disposal section covers the following areas: Safety research focuses primarily on research and development on improving nuclear safety and on refining safety analysis methods and their application in non-nuclear power and power station engineering. Research on the risks inherent in the use of hydrogen on an industrial scale is also being taken up. Reactor engineering mainly involves safety-related analyses and developments, while nuclear waste disposal research focuses on the processing and storage behavior of spent HTR [high-temperature reactor] fuel elements in salt formations. The KFA is carrying out "radioactive waste product monitoring" work with a view to safe permanent storage under contract to the Federal Applied Physics Agency.

The long-term goal of the research and development work on controlled nuclear fusion under way in the industrialized countries is to render the energy released when light atomic nuclei fuse available for economic exploitation. Research in Europe focuses on the containment of the reaction plasma in suitable toroidal closed magnetic devices, and in particular in what are known as tokamaks. The more immediate specific goal is to pave the way for the construction of the successor to the JET (Joint European Torus), ITER (International Thermonuclear Experimental Reactor), in which a "burning" plasma will be generated and maintained.

The KFA's nuclear fusion and plasma research program sets out to study and present systematically the interaction of the plasma with the wall surrounding it, the main goals being to master and control the plasma composition, density, and temperature profile during plasma discharges with pulse lengths of several seconds, and to develop first wall components for that purpose. The requirement is both to avoid excessive contamination of the plasma by the wall material and to guarantee a sufficiently long service life for the wall components. The main test facility used for this purpose is the TEXTOR tokamak, on which matters such as the discharge of energy and particle fluxes, the modification of the plasma boundary layer, the choice of material, and the configuration of the wall system are being studied. Technical processes along these lines for wall conditioning (carbonization, boronization) and for carrying out in situ repairs to such protective layers are being developed and new, highly resistant materials and combinations of materials are being tested. The KFA's work is an integral part of the European Community's fusion program and has been performed since 1962 under a treaty of association between EURATOM [European Atomic Energy Community] and the KFA that provides for a substantial financial contribution from the EC Commission. The KFA's membership of this "joint EC venture" gives it a close involvement in the European JET project, the most advanced nuclear fusion research facility in the world. Its work within the Plasmaphysics Association (Bochum, Dortmund, and Essen universities and KFA), with the EURATOM/Belgian State association, and with the Dutch FOM Plasma Physics Institute is of particular note, turning the TEXTOR into the principal fusion research facility in the Belgium, Germany, and Netherlands euroregion. Also at the international level, an International Energy Agency (IEA) treaty on the use of the Juelich tokamak TEXTOR in force since 1977 gives rise to close scientific cooperation as a result of substantial involvement by the member states: the United States, Japan, Canada, and Switzerland, as regards investments and staffing.

EC: New Eureka Projects Proposed

94WS0043A Paris INDUSTRIES ET TECHNIQUES in French 10 Sep 93 p 100

[Article by Michel Le Toullec: "Announcement at the Close of the French Chairmanship: New Series of Eureka [European Research Coordination Agency] Projects"—first paragraph is INDUSTRIES ET TECHNIQUES introduction]

[Text] Watch in particular proposed developments in the biotechnologies and the environment, which account for four out of 10 projects.

The ninth Eureka ministers' conference, held in Paris at the end of June, managed to make the headlines: Russia joined the 20-member club of this European industrial development program. The most interesting event of the meeting, which also marked the end of the French chairmanship, was the announcement of new labelled projects. A wealth of trails absolutely worth following, especially in the biotechnologies and the environment.

Biotechnologies

- The SNPE [National Powder and Explosives]-Pharmascience group, in partnership with the Italian Mediolanum, obtained the Eureka label for the development of a synthetic compound that will regulate the growth hormone. The program—55 million francs [Fr] over six years—also aims to develop various galenical forms (pharmaceutical preparations ready for use): oral, intravenous, subcutaneous, etc.
- The Pau Cooperative, in partnership with Clovis Matton (Belgium), Senasa (Spain), Van der Have (Holland), and Nordsaat (Germany), launched a three-year program to develop hybrid wheat varieties with better resistance to disease and greater yields. The program will cost Fr90.3 million.
- Tech Sep, a Rhone-Poulenc affiliate, obtained the label to develop a sugar-refining process jointly with the Portuguese company Rar. They intend to replace traditional methods (using lime treatment) by tangential filtration. The main objective is to reduce the number of processing operations and the amount of industrial waste. Cost of this four-year project: Fr19.8 million.

- Agro Industry Research and Development (ARD), the Danish enzyme producer Novo, the Belgian company SES, and the Danish company Maribo, participate in a three-year project (cost: Fr49.9 million) on beet development and promotion. By coupling enzymatic systems with separation techniques, it should be possible to increase (by about seven percent) the production of fermentescible sugars, to lower energy costs, and to reduce insoluble by-products with a low added value.
- Kronenbourg formed a partnership with two brewers, Heineken (The Netherlands) and Carlsberg (Denmark), for an ambitious project that will last four years and cost Fr140 million. It aims to develop barley varieties better suited to malt and beer production. The main objective is to increase the availability of brewery barley, which accounts for only 10 percent of the barley grown. Another objective is to identify the molecular processes occurring in barley during germination and their impact on malt, and therefore beer, quality.
- The Soufflet group was given the Eureka label for the development of new cereal-flour enhancers using enzymatic systems capable of inducing functional changes during bread-making. A four-year, Fr32.1-million project. The partners of Soufflet are the enzyme producer Novo, and the Belgian company Ceres, a producer of bread-making flours.
- The tangential microfiltration of wine is the subject of a program headed by CMCC (a winery equipment manufacturer), the Dutch company X-Flow (a membrane producer), the Montpellier INRA [National Institute for Agronomic Research], and three wineries. The main objective of this 28-month Fr7.5-million project is to reduce pollution by winery waste by eliminating the use of filtering earths. It is also to develop a technique that could be used at all stages of wine-making and would be compatible with all wine types.
- The enzyme producer Gist Brocades participates in a project on the improvement of fruit juice production using specific enzymes; its partner is the Spanish company Nufri. They are interested in improving juice output, finding a use for excess production (apples, pears, peaches), and improving the quality of juices that are currently depreciated, for instance bitter Navel oranges in Spain. The three-year project will cost Fr26 million.

Environment

- Liquid pig-manure processing is the goal of Lafarge Fondu International (LFI), the Cooperl cooperative, the Belgian company Danis, the Ghent university, and several Dutch partners. They want to develop, first, a biological process to eliminate nitrogen, then a mineral process to eliminate the other pollutants. The final effluent will be limpid and odorless, with low DCO and DBO (chemical and biological oxygen requirements), phosphate, and nitrate contents. A two-year, Fr30-million project.
- Dexter, a supplier of inside coatings for preserved food packaging, with the Dutch TDV as a partner, is working on a project involving the reduction of organic-solvent emissions in packaging coatings. The application of a water-based varnish, with a roller varnishing machine or through the "Screen" method, will be studied during this three-year (Fr21.1-million) project.
- One of the most important projects, requiring an investment of Fr150 million over four years, involves the ecological concept of industrial paint. This program will bring together 12 partners, including Renault, Peugeot, Volvo, Akzo, etc. Its objective is to study products, application processes, paint slurries, and air treatment.
- Sita (Lyon Water Company-Dumez group) and its affiliates France-Waste and Inertec joined Rhone-Poulenc and other companies to work on a project concerning the stabilization/solidification of end-waste. This Fr90.4-million four-year project also covers a new storage concept: reversible, inspectable, and controllable storage. It would be used for special or ordinary industrial waste and for household waste.
- Fiberweb Sodoca was given the Eureka label for the development of non-woven fabrics obtained from biodegradable plastics. Other partners of this Fr345-million four-year program: the Finnish chemical company Neste, and Vetoquinol, a French manufacturer of veterinary products. Produced by the hydrolysis of fully degradable polymers and by an enzymatic process, these non-woven fabrics would be used for personal hygiene products, in agriculture, and in filtration.

France: Aid Program for Aviation, Defense PMEs

94WS0108C Paris L'USINE NOUVELLE in French 23 Sep 93 p 23

[Article entitled: "Aid for Ile-de-France Subcontractors"; first paragraph is L'USINE NOUVELLE introduction]

[Text] The General Weapons Delegation (DGA), Ministry of Industry, and regional council want to help Ile-de-France's PMEs diversify.

SNECMA, Thomson, Aerospatiale, Giat Industries—the big aeronautics and weapons contractors are announcing one layoff plan after another. Under the triple pressure of slashed military spending, the airlines' financial stagnation, and competition, industry leaders have decided to eliminate another 6,000 jobs. But if the engines are straining, many of their subcontractors threaten to go under altogether. According to a representative of OSTIAS (Aerospace Industry Subcontracting Observatory), the slump has already caused 15 to 20 percent of the industry's 6,000 subcontractors to fail.

The primary region concerned is Ile-de-France, where the DGA says 40 percent of all aeronautics and defense activity is concentrated. Consequently, the DGA,

Regional Industrial Directorate, and Regional Council have teamed up to promote the reconversion of small and medium-size Ile-de-France companies, which have fallen prey to the general business collapse.

The operation, dubbed AIDA (Action for Defense and Aeronautics Industries), aims to help determined companies draw up a diversification plan complete with figures using its budget of 20 million French francs [Fr]. A program of subsidies specifically to help implement the plans will be taken care of in a second phase.

Only 100 companies will be selected to receive a 20-day audit carried out by private, specialized consultants. Applications should be addressed to the Ile-de-France Regional Chamber of Commerce and Industry, operations manager. Applicants must: be subcontracting firms that generate at least 25 percent of their sales in the aeronautics or weapons industries, not be part of a group, have experienced a drop in sales or orders, and still have "some financial capability."

Boxed Material: Ile-de-France, the Top Region for Employment in Aeronautics and Weapons

- 40 percent of France's activity in this industry
- 75,000 manufacturing jobs, including:—42 percent in aeronautics—39 percent in electronics—19 percent in machines, chemicals, and others
- about eight percent of the region's industrial employment

The Hauts-de-Seine department boasts the highest concentration of industry activity, with 47,000 jobs, including 17,500 in small and medium-size industries.

France: 1994 Civil R&D Budget Outlined

94WS0080A Paris AFP SCIENCES in French 23 Sep 93 pp 1-3

[Text] Paris—"One of the highlights" of the 1994 Civil Research and Development budget, stressed Francois Fillon when he presented his draft on 23 September, is the priority given to medical research, "for which there is a substantial and legitimate social demand in our country." The budget, which the cabinet had adopted the day before, is up 3.7 percent over last year's, and stands at 51.6 billion French francs [Fr].

At Fr43.2 million, the Higher Education budget has jumped 6 percent over 1993, one of the biggest increases in the state budget. This year, the Fr1.22 million in allocations to IUFM students has been transfered to the budget of the National Education Ministry. "In 1994, spending on higher education will grow at the same rate as the projected number of students," noted the minister of Higher Education and Research.

The monies will create 700 instructor-researcher jobs and 200 high-school teacher positions, in addition to 208 non-teaching ones. Fr2.8 million has been appropriated for capital spending on infrastructure and equipment. The government will reform the social assistance offered to students (scholarships, housing, etc.) for the 1994 school year.

Research funding of Foundations and medical research groups is "up sharply" (8.7 percent in appropriations), said the minister. Special attention has been given to genome research and to the National AIDS Research Agency (ANRS), whose budget has increased 10 percent. Another Fr50 million, noted the minister, "will be allocated to clinical research, in conjunction with the Health Ministry" through the Research and Technology Fund (FRT).

"The government's emphasis on medical research has given rise to a Fr100 million funding package for AIDS, genetics, medications, and clinical research." Half of that sum, or Fr50 million, is being shared by AIDS and genome work. Nearly half of the 50 new researcher and extended engineer positions also involve medical research organizations.

The ministry's second priority is industrial research, which includes FRT monies, civil aeronautics and space funds, and industry budget allocations. The total amounts to nearly Fr17 billion (including ordinary expenditures and appropriations), a rise of 5.3 percent. Particular encouragement is being given to innovation by small and medium businesses and industries, through ANVAR (National Agency for the Application of Research), which has been funded for Fr1 billion.

"The budget boosts funding for basic civil aeronautics research to Fr500 million, an increase of 25 percent," says Fillon. Moreover, resources allocated to environmental research are up 20 percent, notably for ADEME [Agency for Environment and Energy Control] and the Polar Institute.

"The entire 16.5 percent increase (in appropriations) for space will be spent to pay off our debts to the European Space Agency (ESA)," said the minister. "We conducted a 'truth-telling operation' this year, by clearing up the ambiguity between appropriations and program authorizations. The gap between the two items, which was Fr3 billion in 1992, has been reduced to Fr0.9 billion in the 1994 appropriations bill." Funds to bring ordinary expenditures back up to par, particularly for the Bureau of Overseas Scientific and Technical Research (ORSTOM) (Fr25 million) and CIRAD (Fr4 million), and transfer of the Atomic Energy Commission's (CEA) Fr780 million package to the general budget "also indicate the government's desire to improve the payment situation for research organizations."

Overall, funding for public research remains stable. The training-through-research package has grown 29.5 percent (Fr1.5 billion). Finally, the cultural, scientific, and technical information budget has declined 13 percent, to Fr59.4 million against Fr68.2 in 1992. "Given the Audit Office's harsh assessment of some organizations, such as the Jules Verne Agency, in its last report, we were less

generous with them," explained Fillon. Similiarly, management of the La Villette City of Sciences and Industry "needs to improve, and the ministry reduced its allocation (-2.3 percent)."

Environmental Budget Up Sharply (9.1 percent)

Though modest as always (Fr1.6 billion), the 1994 Environmental budget will grow 9.1 percent over the 1993 regulated budget, with no change in organization.

"The ministry already received Fr150 million in appropriations in 1993, for the first time within the framework of a recovery plan. The prime minister is once again showing his support for an active, determined environmental policy," stressed environmental minister Michel Barnier on 22 September.

Environment's new funding will notably benefit the Conservatoire du Littoral (Coastline Conservatory), whose budget will increase 25 percent to Fr135 million, and expansion of the policy to prevent natural catastrophes.

1994 Research and Development Budget; Ministry allocations (ordinary expenditures + program authorizations)

Civilian Research & Development Budget 1994 (FrMillions)	OE+PA LFI* 93	OE+PA LFR* 93	OE+PA PLF* 94	Percent Change LFR*
EPST (Public Science & Technology Establishment)				
INRA (Nat'l Agronomic Research Inst.)	3,066.2	3,022.3	2,998.o	-0.8
CEMAGREF*	184.4	180.5	184.1	2.0
INRETS*	210.7	206.2	202.9	-1.6
INRIA (Nat'l Inst. for Research on DP and Automation)	426.2	413.3	427.7	3.5
CNRS (National Center for Scientific Research) + institutes	12,490.5	12,275.4	12,417.1	1.2
INSERM (Nat'l Health & Med. Research Inst.)	2,329.6	2,276.4	2,273.0	-0.1
INED (Nat'l Demographic Studies Inst.)	81.3	79.4	84.7	6.8
ORSTOM	999.5	982.5	1,020.3	3.8
s/TOTAL EPST	19,788.2	19,435.8	19,607.9	0.9
Foundations and Institutions	764.6	747.3	810.0	8.4
EPICS*				
CEA	2,698.5	2,689.7	2,763.3	2.7
ADEME*	263.9	245.2	203.1	-17.2
IFREMER (Fr. Inst. for Research on Exploitation of the Ocean)	946.8	906.8	905.9	-0.1
CSI*	609.2	582.5	568.9	-2.3
CIRAD*	667.3	654.1	667.7	2.1
TOTAL EPIC	5,185.6	5,078.3	5,108.9	0.6
s/TOTAL FOUNDATIONS AND ORGANIZATIONS	25,738.4	25,261.5	25,526.7	1.1
Higher Education	2,118.3	2,031.8	2,049.8	0.9
MESR* Administration	2,654.9	2,391.0	2,391.8	0.0
including				
Incentives, information, consult.	29.8	25.3	68.5	170.8
Training for and through research	1,382.6	1,350.6	1,445.0	7.0
CSTI, Future Trends & Research	18.9	17.0	12.0	-29.5
RTF	928.3	728.7	666.2	-8.6
Culture, Scient. & Tech. Information	76.6	70.8	50.0	-29.4
TOTAL MESR BUDGET	30,511.6	29,684.3	29,968.3	1.0
TOTAL OTHER MINISTRIES	23,207.0	22,255.6	22,589.6	1.5
TOTAL CRDB	53,718.6	51,939.9	52,557.9	1.2
* Expansion unknown				

The three tables below provide the key data for the 1994 Higher Education budget. The first gives the corrected figures for 1994 transfers (research allocations, IUFM allocations).

ORDINARY EXPENDITURES	1993	1994
Personnel expenditures	22,257,381,021	23,425,021,677
Operating expenses	4,918,577,983	5,275,516,474
including 36.11	4,640,515,547	4,927,965,616
Social programs	6,176,681,268	6,848,026,997
including scholarships	4,796,724,026	5,394,724,026
and charitable subsidies	1,379,857,242	1,453,302,971
TOTAL OE	33,352,640,272	35,548,565,148

CAPITAL EXPENDITURES (in FrThousands)

	1993		1994	
	PA	Approp.	PA	Approp.
Construction	2,276,000	1,747,500	2,010,000	1,768,000
Equipment	545,900	551,900	660,000	594,000
Maintenance	528,000	499,500	530,000	529,000
TOTAL excl. research	3,349,900	2,798,900	3,200,000	2,891,000
TOTAL univ. research	1,854,000	1,789,090	1,786,080	1,771,690
TOTAL capital spending	5,203,900	4,587,990	4,986,080	4,662,690

TOTAL (in French francs)

	OE+PA	
	1993	1994
	33,352,640,272	35,548,565,148
	5,203,900,000	4,986,080,000
TOTAL		
	38,556,540,272	40,534,645,148
	2OE+Approp.	
	33,352,640,272	35,548,565,148
	4,587,990,000	4,662,690,000
TOTAL		
	37,940,630,272	40,211,255,148

France: Effect of 1994 Budget on PMIs Discussed

94WS0078A Paris L'USINE NOUVELLE in French 30 Sep 93 pp 24, 25

[Article by Jacqueline Mattei and Stephane Farhi: "PMIs Win the Budget Marathon"; first paragraph is L'USINE NOUVELLE introduction]

[Text] One of the features of the 1994 budget is its support for local industry. But will the pro-business measures be enough to reinvigorate small and medium industries (PMIs)?

Reining in state spending while providing a shot in the arm to the economy is the challenge Edouard Balladur's government has set for itself. The 1994 budget strives for both rigor and effectiveness. It aims to get business moving again by alleviating income taxes and supporting companies, first and foremost PMIs.

But are the solutions finally settled upon as good as the professed intentions? The figures can be interpreted in so many different ways that it is hard to say. For instance, the decision to eliminate the partial deductibility of the CSG (General Social Security tax) will cost 8.4 billion French francs [Fr] for a full year. This immediately chips away at some of the benefits of the income tax reform, a Fr19 billion "gift" to taxpayers. Taken as a whole, mandatory withholding rises from 43.6 percent of the gross domestic product in 1993 to 44.4 percent in 1994—not exactly a change likely to whip up consumer appetitites.

The situation is just as ambiguous on the spending side. The Budget Ministry puts the increase in research funding at 10 percent, and the Research Ministry at 3.5 percent. The Environmental Ministry talks about an increase in its funding, while Budget announces a cutback of 3.7 percent. Everything depends on whether calculations are based on program authorizations (spending commitments) or appropriations (sums actually disbursed), on the 1993 initial appropriations bill or the amending bill adopted by the new parliamentary majority in June, 1993. The amending act increased some items and trimmed others. ANVAR (National Agency for the Application of Research) illustrates the situation fairly well. Depending on the criteria used, 1994 funding (Fr996 million) can appear to shrink 11 percent or jump 27 percent. Overall, Nicolas Sarkozy's budget limits state spending increases to 1.2 percent (Fr1,427 billion) and saves Fr50 billion on voted services. But it leaves intact both traditional state functions (defense, justice, police) and current priorities (employment, national social safety net).

Incentives Restored

Is industry one of those priorities? Looking at the budget for the Industry, Postal, and Telecommunications Ministry, which grew (1.1 percent) less than inflation (2.2 percent), the answer may appear to be no. Nicolas Sarkozy defends himself against the charge. "The merger of the two ministries," he points out, "made it possible to cut operating expenditures." Moreover, the budget restores incentives. Says Sarkozy, "We retained the most dynamic and efficient allocations, to jump start the French economy."

The big winners in this bargaining process are PMIs. The recently created PMI investment fund, which combines various existing aid programs (industrial redevelopment funds, investment subsidies for rural areas, etc.), has been allocated more money. With Fr800 million in program authorizations (Fr600 million in appropriations), the fund is substantially fatter than previous

programs, which garnered a total of Fr500 million. It is even bigger than the Fr750 million package set aside in the "maximum spending letter." Gerard Longuet pushed through the increase by appealing directly to Edouard Balladur.

The fund will make it possible to underwrite 20 percent of PMI investment, and will give smaller industries incentives to hire (Fr30,000 per job created). Investment fund monies will be channeled through plan or regional contracts, in order to decentralize aid as much as possible. Indeed, support for local industry is one of the keystones of the 1994 budget. To that end, the budget also maintains the research tax credit and instructs ANVAR to reserve its innovation subsidies for small companies (see boxed material). But this does not mean the state shareholder is neglecting big public companies: Between the 1993 annual Tax Act, the 1994 budget, and revenue from privatizations, they will receive Fr21 billion in subsidies. Will these measures to aid companies, combined with the hoped-for consumer recovery, be enough to pump up PME/PMIs? Lucien Rebuffel, president of the General Confederation of Small and Medium-Size Companies, thinks so. "Income tax cuts, a shift of savings into productive uses, and consumer incentives will bolster business."

Not everyone shares Rebuffel's satisfaction. Even within the majority, some deputies are getting ready to propose additional measures to help companies. Philippe Auberger (Rally for the Republic/RPR) is thinking about tax exemptions for mutual funds reinvested in PMEs, while Jean-Pierre Thomas (French Democratic Union/UDF) wants to see an "investment tax credit."

Building and public works companies, which were especially spoiled by the June 1993 Annual Tax Act, are somewhat disappointed. Funding for housing is down 5.5 percent, while equipment allocations have dropped 2.4 percent. But the Building Federation is not overly troubled, since "the proposed budget retains most of the positive elements of the June 1993 housing recovery plan." Although the number of subsidized rental loans has fallen (90,000 against 101,000), property-owner loans are up (55,000 against 40,000 actually awarded in 1993). This should create 22,500 direct and indirect jobs. Public works firms are much more worried. Philippe Levaux, president of the Federation, has sounded the alarm, pointing out that "Less than four years after Parliament passed it, the government is nullifying the plan to support public works." Levaux predicts "thousands of layoffs." His analysis is based on the decrease in the roads budget (-31 percent compared to the annual Tax Act, -10.7 percent over the initial 1993 draft) and on stagnant funding by local collectivities.

Local elected officials, for their part, are looking disgruntled. Though the government considers decentralization a priority, and though regional planning funds in the Interior Ministry are up 18.5 percent, assistance to French collectivities is stagnant at 1993 levels (Fr250 billion).

Finally, researchers have their own reasons for worry. Research is no longer a great national priority.

In 1994, funding for the Ministry of Higher Education and Research will grow only 3.5 percent, to Fr30 billion (Fr2 billion for higher education).

The entire civil research budget totals Fr51.6 billion, or an increase of 3.7 percent over the annual Tax Act, which had deeply cut the initial 1993 budget. To that must be added Fr3 billion in EC research subsidies and Fr4 billion in research tax credits. Although the government still displays a willingness to stimulate industrial research, Industry and Research Ministry funds allocated to that item have not grown more than 1.5 percent, to Fr7.1 billion.

Finally, it is difficult to assess the government's real intentions when it comes to relaunching big technology programs. The only stated priority concerns biological and medical research, whose funding is up 8.7 percent. Higher education and research minister Francois Fillon argued in favor of restoring the big programs, notably in the areas of space and nuclear technology, when he took office last May. Two weeks ago, Fillon announced a plan to consult with national players on science and technology policy, with the process to wind up with a Parliamentary debate in the spring of 1994. Today, he has retreated into this debate as a way of defining his strategy. "Our priorities," he says, "will be whatever comes out of our nation-wide consultation."

In the meantime, amid a general climate of restrictions, the 1994 research budget—like industry's—appears to be a transition budget. Is that enough to give French industry a shot in the arm?

Research Tax Credit Upheld

PMEs are enthusiastic users of the Research Tax Credit (RTC), which was extended through 31 December 1995 by Beregovoy's government in late 1992, and upheld by Balladur last year (Fr4 billion). According to the Research Ministry's latest report on 6,512 1991 declarations, companies generating under Fr100 million in sales garnered 59 percent of the RTC. As a group, such companies accounted for 44 percent of total R&D spending. In contrast, big companies, which account for nearly half of all R&D spending, absorbed a quarter of the RTC.

The RTC tax incentive reduces the tax on companies or income (capped at Fr40 million) by 50 percent of a firm's increase in R&D spending over the two preceding years. Personnel expenditures top the list (58 percent) of expenses declared for RTC purposes. The government had to work out new areas, such as software development, following "extensive" use of the RTC by software engineering firms. The industry that collects the most RTC is electronics, at 13.8 percent, followed by machines and metal working (11.2 percent), research and consulting (10.8 percent), pharmacy (8 percent), engineering (5.5 percent), and automobiles (5.2 percent).

Rising Budgets (Ordinary expenditures + appropriations in FrBillions)

Ministries	1993 (1)	1994	Percent Change
Regional Development Planning	1.9	2.3	+18.5
Agriculture and Fishing	44.1	47	+6.6
Social Affairs, Health, and Urban Affairs	55.7	58.1	+4.3
National Education	241.6	251.3	+4
Labor, Employment, and Professional Training	79.5	82.6	+3.9
Research and Higher Education	28.9	29.9	+3.5
Defense	239.4	242.5	+1.3
Industry, Postal, and Telecommunications	30	30.4	+1.1

Falling Budgets (Ordinary expenditures + appropriations in FrBillions)

Ministries	1993 (1)	1994	Percent Change
Equipment, Transport, Tourism	85.3	83.2	-2.4
Environment	1.7	1.6	-3.7
Housing	40.4	38.2	-5.5(2)
Commerce and Trades	0.60	0.56	-7.4

(1) 1993 budget revised by last June's annual Tax Act and calculated on the basis of ministries as organized in 1994. (2) Excluding exceptional measures of the annual Tax Act, housing funds are up 11.6 percent over the initial 1993 budget.

France's SNECMA Looks to Alliances for Survival

94WS0078B Paris L'USINE NOUVELLE in French 30 Sep 93 pp 32,33

[Article by Jean-Francois Jacquier: "SNECMA Broadens Its Base of Alliances to Survive"; first paragraph is L'USINE NOUVELLE introduction]

[Text] The French enginemaker is seeking a collaborative deal with the Russian firm Perm to develop a new civil jet engine. Such an agreement would be a thorn in the side of its American partner.

By informing SNECMA president Gerard Renon that he was not included in the PM's rebuke of public companies for their (inadequate) efforts to stem unemployment, Edouard Balladur deliberately paid hommage to SNECMA's social and labor policies. Yet by late 1994, the aeronautics slump will have forced the national enginemaker to eliminate over 2,000 jobs in three years, thereby reducing its staff to 11,425. The company made the cuts, however, without laying anyone off. "For us it is a way to survive the recession without brutally affecting personnel or sacrificing our expertise," says Gerard Renon.

For Balladur's exemplary social laboratory is also faced with formidable challenges, the same ones its competitors are struggling with. Financial difficulties, technological battles, and a collapsed market have put the very survival of SNECMA at stake, and with it France's ability to design airplanes, satellites, and rockets. Indeed, parent company SNECMA—together with its subsidiaries Sep, Messier-Bugatti, Hispano-Suiza, etc.—is a strategic group of 25,000 employees that generates 23 billion French francs [Fr] in sales. It is also a core manufacturer of all types of aerospace propulsion systems.

SNECMA's current success derives essentially from its productive, 20-year-old non-military collaboration with America's General Electric (GE). The commercial penetration of the CFM-56 family of jets which SNECMA—previously stuck in the military niche—developed as an equal partner with the world's industry leader transformed it into a full-fledged engine manufacturer. There are 6,000 CFM-56s in service in 176 airlines, making it the world's best-selling engine. It also the product that boosted SNECMA to the rank of third-biggest manufacturer in the industry.

SNECMA is now seeing the flip side of this success. The steep drop in French Air Force orders and the poor export sales of Dassault's Mirage were followed by a slump in the air transport industry (70 percent of SNECMA's business) that is now hitting the manufacturer full force. Between canceled and postponed orders, CFM-56 deliveries fell from 880 in 1991 to 500 in 1993. The consequences—excess capacity, reduced margins, 1992 losses of Fr600 million (on sales of Fr13.5 billion), and Fr2.5 billion in debt—were not slow to surface. What is more, Gerard Renon "does not see any signs that a recovery will take place for at least another three years." At that time, he says "Only those who were able to continue preparing new products and developing new technologies will survive."

A Historical Turning Point

That is the gamble SNECMA has decided to take. And in the field of aircraft engine manufacturing, winning such a gamble means being active in all areas. The problem is that with the cost of developing a new engine at $1 billion minimum, SNECMA may not be able to keep up. It is already spending Fr4 billion a year on industrial research and development, or 30 percent of its turnover.

SNECMA can no longer sustain this level of investment, which is well above that of its competitors (see table). Its inability to do so is its main weakness. The manufacturer's rivals (Rolls-Royce, Pratt & Whitney) and its principal partner (GE) are two to four times bigger and belong to powerful groups that are broadly diversified in the electromechanical, electronics, and turbine industries.

To offset this handicap, the French firm has decided to increase—and broaden—the number of its team ventures. It will do this first with General Electric, whose contribution, says Gerard Renon, "is an excellent capital that must be preserved." One example is SNECMA's 25

percent participation in the development of the GE 90, the world's biggest engine slated for use in the Boeing 777 and future super-jumbo jets. Another is the recently-launched development of a top-of-the-line CFM-56 model, which Boeing has selected as the only engine to propel its new-generation 737s.

Nonetheless, despite the refusal of SNECMA headquarters to discuss the matter, the 20-year-long collaboration with the Cinncinati enginemaker is becoming oppressive. If the relationship were to deteriorate, three-quarters of the French manufacturer's business would be jeopardized. And for military reasons stipulated in the company's charter, some officials at the General Weapons Delegation (DGA) have expressed concern about this overdependence. It is no secret to anyone that GE, despite its conciliatory statements, would snap up SNECMA in a second if the opportunity presented itself. The addition of SNECMA's name to the list of privatization candidates has revived fears that it might.

So, forced by the slump into a turning point in its history, SNECMA has no choice but to broaden its alliances. It has teamed up with Rolls-Royce to prepare the future generation of supersonic jet engines, is working with it on composites, and is considering collaborating with the British firm on the post-Rafale engine.

At the Bourget Show, SNECMA signed another agreement with General Electric—but also with Germany's MTU and the other American firm Pratt & Whitney—to build less powerful civil engines aimed at the commuter plane market.

But its most surprising alliances are being struck in eastern Europe. After selling the license for the Larzac this summer to the Russian firm Mikoyan, which will use it to make the new engine for its MIG AT training plane, Gerard Renon reveals that "We are now seeking to team up with Perm (Siberia) to develop a new civil engine in the 40,000-lb thrust range." In other words, the range used to equip Boeing 757s. This is a thorn in the side of GE, which has no product for that niche. "We live in a dangerous world, made more so by the industry slump. Collaborative ventures are a way of spreading the risks and misfires, and we want to broaden ours," remarks Gerard Renon.

Such a policy would obviously have no chance of succeeding if SNECMA did not have a few technological assets. In that respect, the company's development of the Rafale M88 considerably boosted its credibility. Its plan to cut costs (30 percent) and development cycles (one year) will also enable it to post one of the best 1993 results, as a percentage of sales, in the industry: 15 percent, compared to 20 percent for GE and 10 percent for the others.

That leaves the problem of establishing in Europe what Gerard Renon calls "conditions of fair competition." "American aeronautics manufacturers," points out SNECMA's boss, "receive a billion dollars a year from NASA." If the playing field is leveled, SNECMA will be able to bounce back and perhaps open up to private investment. Alsthom is reportedly interested.

Chart Information

1. The CFM-56 has elevated SNECMA to third place among enginemakers internationally. Percentage shares of the world market (based on the catalog price of engines delivered by each manufacturer in 1992 for planes with over 100 seats) break down as follows: General Electric (U.S.) 36.5 percent; Pratt & Whitney (U.S.) 30 percent; SNECMA (France) 17.5 percent; Rolls-Royce (Great Britain) 13 percent; others 3 percent. SNECMA's American alliance has enabled it to make a remarkable penetration of the civil jet engine market. Starting with no market share at all in the seventies, it has now pulled ahead of the English firm Rolls-Royce. Source: SNECMA

2. The flip side of success: 70 percent of SNECMA's business now involves producing engines for non-military aircraft. The airline crisis is having a serious effect on its orders. In four years, they have dropped by virtually two-thirds. Annual changes in the orders won by SNECMA, in Frbillions: 1988, 22.7; 1989, 12.4; 1990, 10.5; 1991, 7.3; 1992, 9.3. Source: SNECMA

3. An unsustainable level of research investment: SNECMA's small size forces it to invest a disproportionate amount of money in research to keep up with the top enginemakers. With the slump at its peak in 1993, the manufacturer will spend 30 percent of its turnover, including three-quarters from its cash flow, on R&D. The following gives the breakdown, in Frbillions and as a percentage of sales, of what various manufacturers spent on industrial research and development in 1991 (last year for which comparative figures are available): SNECMA, 14.5, 25.5%; Rolls-Royce, 20.2, 18.9%; Pratt & Whitney 40.6, 18.1%; General Electric 44, 14.0%. Source: U.N.

German Leaders Differ on Reforms for Large Research Institutes

94WS0085A Duesseldorf HANDELSBLATT in German 5/6 Nov 93 p 6

[Article: "BDI President Calls for 'Innovation Offensive'"; Subheadline: "Industry Willing to Join Government in Search for 'Right Topics'—Call for Reforms"]

[Text] Bonn, (HANDELSBLATT)—The Federation of German Engineers [BDI] is intensifying its call for reform of the Large Research Institutes [GFE]. At the yearly meeting yesterday in Bonn of the Working Association for Large Research Institutes [AGF], BDI president, Tyll Necker, called on the federal research minister to quit controlling the topics. As a result of such control the GFE are too heavily focused on governmental demand for research.

Instead, Necker called for stronger and more timely participation of Industry in coming up with topics for the GFE through heavier use of industry advisory committees and boards of directors as well as roundtable talks between industry and large research on institutes and topics. The president of BDI clarified that this should not constitute any "pre-emptive decision making." In his view it means a stronger focus on application and innovation. BDI's president applauded the fact that nearly 30 percent of the 120 institutes were completely realigned in the 13 GFE of the former federal states by being split up, consolidated or reoriented. He went on to say: "But there still has been no great success in satisfying the closely inter-connected requirements better than at present." What is needed is a search for the right topics, more efficient use of resources and rapid conversion of research results into products. According to Necker, this will come about in the final analysis only through structural reforms.

BDI's president explained that the key to this is autonomy and competitiveness. As the basic ingredients, he recommended basic government financing, autonomy in application of resources and independent recourse to third party resources plus successful leadership participation. Third-party resources could enhance a decentralized topics search enabling the forgoing of a large share of centralized political standards.

Necker clarified that greater competitiveness required considerably expanded autonomy. The first step, therefore, would have to be deregulation and assurance of genuine financial and administrative autonomy of the GFE. There should also be personal autonomy, in this context, for the directors of institutes to be able to make themselves available wherever their advice is solicited, including industrial boards of directors.

To be sure, on the occasion of the GFE session, federal research minister, Paul Krueger (Christian Democratic Union [CDU]), called upon industry and academia to enter into a dialog with one another. Otherwise, his press report contained little about reform and much more about praise for the GFE. In Krueger's view, there already are in some centers initial, favorable instances of industry-GFE cooperation. Based on the GFEs' reorientation, over the long term the research centers would become even more competitive. Even at present, the 16 GFE and their approximately 20,000 employees, are one "of the most important implements for the advancement of science and technology." Krueger expressly emphasized that he deemed knowledge-oriented basic research to be both necessary and important. Consequently, basic research will continue to be supported even further at the current high level.

Joachim Treusch, AGF chairman, was the only one to confess that the search, coordination and implementation processes had to be improved and this had to be done quickly. But for it to be at the expense of Germany's highly-developed and internationally recognized basic research would lead to "virtually irremediable damage." It was precisely the Japanese who first initiated the race to catch up in basic research. This competition too would have to be withstood. In Treusch's words: "The springs are still gurgling. It is we ourselves who have to learn how to draw from them in a better way without depleting the groundwater in the process.

EC Project Sponsorship Brings Few Results

94WS0090A Duesseldorf VDI NACHRICHTEN in German No. 42, 22 Oct 93 p 4

[Article by Rainer Antkowiak: "EC Project Sponsorship Has Small Success Rate"; subheadlines: "Europes Problematical Research Policy"; Germanys Competitiveness Suffers]

[Text] Dortmund—Is Europes research policy hurting Germanys field-directed research? Is Brussels approval process for EC sponsored research undercutting the competitiveness of Germanys machinery, automobile and equipment manufacturing? Professor Eckart Doege, chairman of the Scientific Society for Production Engineering in Bonn, answers such questions with a resounding yes.

Merely for the preparation of his project application, the average costs for an applicant amount to DM30,000-50,000. To promote the European idea, Brussels, almost without exception, stipulates cooperation with non-EC countries for its projects. The results are frequent trips and an expenditure of time that not infrequently are the equivalent of three person-months per project. Those are costs and trouble that are less and less frequently recouped. On average only one out five project applications is approved. Professor Manfred Weck of the Laboratory for Machine Tools and Business Theory at the Aachen Institute of Science and Technology [TH] reported this success rate in a nationwide survey of university production engineering group institutes. According to Weck: As an applicant you initially have to anticipate spending five times DM50,000 or as much as DM250,000 in order ultimately to get a single project approved. Even the Federal Ministry for Research and Technology [BMFT] admits that is a sizable outlay. But it is an outlay that appears not to make much of an impression there. The reply that Doege got was: That is the way things are in international projects. Doege had also been noting the looming threat to public and industrial financing of university institutes in the field of production engineering. In Doeges words: There is no disputing the support provided through government projects. It is the only way for basic research and research focused on industry to be able to be accomplished with results that have been and will continue to be of major importance for Germanys manufacture of machinery and equipment.

While industry has learned from its losses and with increasing frequency turns thumbs down when EC research sponsorship is mentioned (in Wecks words: At present I cannot find any more industrial partners for

many project ideas.). Bonn is promising solutions to the problem through consultation. The word there is that, in cooperation with the appropriate specialized coordinator, the ministry is constantly striving to improve the applicants situation and will fully assist him in the application process.

Will the BMFT succeed in securing for German applicants in Brussels the research sponsorship that other countries have already been getting for their clients there for a long time? Weck can report from his personal experience that Spain and France, for instance, very actively cultivate contacts in Brussels. According to Weck: They routinely have actual contact personnel there and engage in extremely successful lobbying.

Professional consultants could be of further assistance in this awkward situation. Peter Wolfmayer, attorney and head of the market and management sector of ZENIT GmbH, a consulting firm in Muelheim a. d. Ruhr, cautions against misjudgments: Anyone submitting an application to Brussels just because of the subsidy has definitely been ill advised. He would never recommend to anyone that is able to finance one his own a research and development plan to apply for government funding for it. The hurdles in this connection are relatively high and the terms are comparatively tough. Therefore a German medium-size outfit should proceed with extreme caution and restrain in applying for EC technology sponsorship.

Sigrun Luefter, head of the EC advice center project for companies at ZENIT, urges all applicants to demonstrate a pioneer spirit, to think long-term and not just regard the know-how developed in projects. Otherwise there is no justification for the underlying trouble and expense.

Such assessments and recommendations raise the question of how well advised the national policy is that refers to funding sources in Brussels for the financing of vital research in order to circumvent, with good reason, the domestic economy.

EC Research Practices Criticized

AU [publication] Duesseldorf VDI NACHRICHTEN [in German] No 42, 22 Oct 93 p 3

[Article by Wolfgang Mock: "EC Research of Little Help in Competing", subheadlines: "Europes Technology Policy Lacks Not Merely Money But Long-Term Thinking As Well", Increasingly Vocal Criticism of Precompetitive Research Sponsorship Restriction]

[Text] Brussels (VDI-N)—Based on a decision of the Federal Constitutional Court, the Maastricht Treaty may enter into force on 1 November. But there are glitches in the details. Not only is the joint financing policy creating difficulties, Europes research and technology policy is also being obstructed by the large European Community [EC] countries.

The ECs research and technology policy is in search of a direction, torn as it is between its requirement to create the necessary conditions for the competitiveness of European industry while simultaneously not overstepping the bounds of precompetitive research sponsorship. For this reason, last week in Brussels even former EC commissioner Etienne Davignon charged it with a certain degree of absurdity,: First, it is not possible to call for more industrial competitiveness and then say that a project that entails a direct industrial application cannot be sponsored.

Weighing even more heavily on the research policy makers in Brussels, however, is the fact that, at present, they still do not even know how many and what sort of projects they can finance at all next year. Early last week, the research ministers of the EC met in Luxembourg, but no agreement was reached on the subject of financing the projected fourth research framework program for 1994-1998.

The fourth research framework program submitted by EC commissioner Antonio Ruberti provides sponsorship funding totaling 13.1 billion European currency units [ECU] (DM25 billion) for 1994-1998. Nearly 30 percent of those funds should flow into the sponsorship of data and communication technologies, almost 19 percent into energy engineering, approximately 14 percent into the life sciences and 7.4 percent into environmental engineering. The remainder will sponsor traffic research, social policy analyses, cooperation with third countries, promotion of applications for technical developments and advanced training of scientists.

The European Parliament repeatedly dismissed those amounts as insufficient. The principal reason for doing so was that Ruberti had incorporated into the fourth research framework program sponsorship plans of a kind that had not been previously included, such as, the thermal program (energy research) or scientific cooperation with third countries. European representative, Detlev Samland (Social Democratic Party of Germany [SPD]), points out: De facto, the fourth research framework program will entail a reduction of funding compared with previous years.

For this reason, EC representative, Rolf Linkohr (SPD), would like to kick in at least another half billion ECU for Rubertis proposals. That is why at the end of last week at the science summit held in Brussels by the EC Parliament and the EC Commission, Linkohr also called for an increase of nearly ECU 502 million, to ECU13.602 billion for the research framework program. Tied in with that was a special plum for Europes coastal regions. Linkohr wants a large-scale expansion of sponsorship for oceanology and ocean technology. As early as June of this year, maritime industry representatives had called for 10-15 percent share in the fourth research framework program (VDI-N, 28/93).

The position of the European research and technology ministers on this matter remains undetermined. They will ultimately be deciding on the funding of the research

framework program at an EC ministerial council. According to Linkohr, it is primarily the prosperous nations that are obstructing an agreement at the moment. At the meeting of the European research ministers last week in Luxembourg, while some of the smaller EC states called for yet an additional increase in the framework program, the British delegation signaled that it would not exceed ECU11 billion, the negotiating margin of Francois Fillon, Frances research minister, was situated between ECU11 billion and ECU13 billion, and it was the impression of the partners that the Spaniards did not yet want to commit themselves.

Federal research minister Paul Kruegers hands were also tied in Luxembourg. For so far, Finance minister Theo Waigel cannot be induced to make any definite commitment. While Krueger wants as much money as possible for EC research, Waigel is striving to economize. The conjecturing in Brussels is: If he now gives Krueger a margin for bargaining, then he can be certain that Krueger will take it to the topmost limit.

Krueger also earnestly wants to modify the EC Commissions research framework program. Whereas the Commissions proposal provides just ECU 970 million for environmental research, Krueger wants this amount to be raised to at least ECU1.6 billion.

Meanwhile, time is pressing. Clear heads have to prevail at the next session of the EC research ministers on 6 December. Afterwards, the European Parliament will again take up the research budget. Not only is the budget issue and the amount of environmental funding a moot point. Another moot issue is the question of financing for the European Major Research Facility in Ispra, for which nearly ECU1.1 billion were earmarked in the 1994-1998 research framework program.

Likewise undetermined is whether, for example, certain sectors, such as aviation or the maritime industry that has now been brought up again by Linkohr, should be more actively sponsored than earlier planned. Samland dreads: If the entire process is not wrapped up before the European Parliament elections in June of next year, then the whole thing will start all over again.

Frustration is growing among European representatives over this sluggish development. As Linkohr says: European research is essentially being held hostage. Egon Klepsch (Christian Democratic Union of Germany [CDU]), president of the European Parliament, voiced resistance. If industry and national administrations commit the error in tough economic times of economizing on outlays for research and development, then the Community should be a model and resist such cuts.

It remains to be seen how far the Parliament will go. Under the terms of the Maastricht Treaty it not only has a right to participate in the contents of the research policy but also in the decision making on the budget. The Parliament therefore can refuse its assent to the fourth research framework program. Budget expert Samland, however, is confident that things will not reach that point and the Parliament will be able to exert sufficient pressure to implement the envisioned high level of spending.

But Parliament is once again in turmoil. Parliament, more fervently than the EC Commission and the European research ministers, wants to distance itself from the virtually metaphysical obligation for precompetitive research (Linkohr). According to Linkohr, in a draft of a report on the EC Commissions fourth research framework program: It would make life easier if we could give up this excuse of precompetitiveness, since it is not without consequences.

FRG: Politicians, Industrialists View Problems in Innovation

Jens on Research, Innovation

94WS0110A Duesseldorf HANDELSBLATT in German 19-20 Nov 93 p 6

[Article by Uwe Jens, a member of the German Bundestag and spokesman for the economic policy of the SPD, a Bundestag party: "Position Policy: German Economy May Have Overslept Its Future; Fundamental Innovation Weakness May Lead to Germany's Decline"]

[Text] Bonn, HANDELSBLATT—The worst recession of the postwar era has exposed Gemany's considerable structural weaknesses for everyone to see. Among them is a fundamental weakness in making innovations in particular. If we do not change course here, this innovation weakness may lead to the decline of Germany as an industrial nation.

Measured in terms of its share of world trade in the conventional industries, like mechanical engineering, the automotive industry, chemistry, and electrical engineering, Germany is the leading nation. These are industries with sophisticated technologies in which the basic discoveries were made at the beginning of this century. In 1990 Germany controlled 17.5 percent of the world market as against 14.8 percent for the United States and 12.8 percent for Japan.

The situation as concerns high-tech industrial products is quite different: Germany's share of the world market for them dropped from 16 percent (1970) to 13 percent (1990). During the same period Japan's share rose from 12 percent to 19 percent; the United States' share dropped from 28 percent to 24 percent, with a tendency to decline.

Germany leads in the patent statistics, the indicator of success in research, in Europe, but we have fallen far behind in comparison with the United States and Japan, even considering the differences in population size.

Increasingly Less Money Spent on Research

For 10 years now, Germany has been spending less money on research and development. The federal

research budget has shrunk in real terms. The percentage of the economy devoted to all appropriations for research dropped from 62.3 percent in 1989 to 58.9 percent in 1992. Research institutes and universities are suffering from a multitude of outmoded structures, internal problems like overcrowding, and—not least of all—lethargy.

But Germany's chief problem is not science and not research, but a notable weakness as concerns the conversion of new technologies and other discoveries into marketable products.

The German economy has overslept its future in many areas: in the development of new foreign markets and new domestic markets, that is to say, of markets in industrial countries. Germany's economy has been resting on the laurels of its past successes. And the government has supported all conservative, anti-innovative, and preservative forces with its "carry on, Germany." For the future it is not enough for us to more intensively promote hitherto neglected technology fields like microelectronics and genertic engineering and to develop and market new products. New management methods, new forms of cooperation between firms and new ways of organizing work, as well as innovative financing models in a world economy that is growing together must be found.

Recognizing and exploiting worldwide trends constitute the basic prerequisite for a change in our innovation policy. The major trends of the future are already evident today:

- Worldwide industrialization, first and foremost in the Asian countries and Eastern Europe;
- growing pollution of the environment linked with a new style of economizing in the industrial countries as well;
- a technology revolution as a way of overcoming worldwide problems.

Areas in which action can be taken and recommendations must be derived from these global tendencies, orientations developed, measures for private and public sector economies formulated, and operational assignments prepared. The "future and technology council for the assessment of the German economy's long-term competitiveness" called for by the SPD [Social Democratic Party of Germany] should achieve this.

Textbook Model Ideological Definition

The road to the future is not through top-level talks. The integration of all segments of our society is called for to develop Germany's ability to innovate. Innovation begins with companies and government agencies. New ways of working and new forms of management are needed to arouse and make use of people's innovative potential. Employee participation "innovation groups," for example, would be a good way to begin.

Policy-makers must develop and foster "conflict management." There is no willingness to make compromises and no rational way of dealing with conflicts without social security and fair distribution of burdens. The assurance of social stability in our society is a basic prerequisite for its ability to innovate.

This innovation weakness cannot be overcome without a market economy structured policy that is oriented toward the future. Laws and approval procedures are only a little to blame for the innovation weakness. The greater blame lies with the structures of the economy itself and with management's rigidity. Since Germany's economy cannot—that is, not fast enough—convert innovations [into marketable products], the federal government must reorganize and revive the interchange between research and the economy. The transfer of technology from research to the economy must be improved. But science is also more effective in bringing up practical economic questions. Science and technology administrations must reassess and take into account market trends together with the economic sector more than they have up to now.

Criticism of the BMFT [Federal Ministry for Research and Technology] focuses on too much aid for technology and too little for market orientation. The way the Japanese go about it shows us how a reformed innovation system should look: The rapid transfer of new technologies and new market requirements is only effective when all those involved cooperate.

A decisive reason for our economy's weakness in the area of innovations today has its roots in our ideological fixation with textbook models. The ideas of strategic technologies, sectors, andindustries can only serve as rough guidelines. However, we can only decide whether a given product can stand up to the selection process of the market by supporting ideas, developments, and initial market experiences for an innovation. The interests of the federal government and the economic sector have so far not had enough in common up to this phase of market testing. Our technology and economic policies have not been oriented toward the laws of dynamic, oligopolitical markets. This is why new enterprises, as opposed to the dinosaurs of the postwar era, must be able to exist here and receive more state aid: in the form of aid for projects, risk and investment capital, and aid for introducing their products into markets. Market-related aid—preferably through repayable loans—must be considerably expanded. A new joint effort by the federal and state governments would be needed to ensure greater promotion of innovations by the states. Not only does subsidization speak in favor of this, but also closer associaiton with small and medium-sized companies.

Telecommunications Needs, Strategic Errors

94WS0110B Duesseldorf HANDELSBLATT in German 19-20 Nov 93 p 6

[Article by NA: "Head of BDI-OeTV Criticizes Firms' Shortcomings; Advances in Technology Through Innovative Procurement"]

[Text] Cologne, HANDELSBLATT—On the occasion of the Sixth BDI [Federal Association of German Industry] Technology Conference in Cologne, Baden-Wuerttemberg Governor Erwin Teufel called for a single-minded advance into new technologies and industrial fields.

Teufel said that Germany and Europe need a competitive information technology and microelectronics industry. Of all the branches of industry these show signs of the greatest growth. He said that Europe has the biggest foreign trade deficit in this sector. Teufel said that he supports cooperation between public sector research in microelectronics and private sector microelectronics production that is oriented toward the needs of the small and medium-sized user industries.

The German Telecommunications Office called on Teufel to put together a wideband communications network as soon as possible. Germany also has to catch up with other competitors in the fields of biotechnology and genetic engineering. Intelligent new computer systems for traffic control would have to become the German economy's best-seller export items. Teufel also sees a high growth potential worldwide in the field of modern environmental technologies, in which Germany is a leading contender.

Prof. Gerhard Zeidler, the chairman of the BDI Committee for Research and Technology Policy and chairman of the board of Alacatel SEL, Inc., expects advances in technology through innovative public sector procurement. He said that he favored integrating future public infrastructure projects with technology strategies. The points of departure for this would be the swift development of wideband communications, the speedy development of integrated traffic control systems, the innovative production and supplying of energy, or the realization of the transrapid.

OeTV [Trade Union for Public Services, Transportation, and Traffic] chairman Monika Wulf-Mathies criticized German industry for having failed to set the course for increases in productivity in the 1980's. She said that it had rested on the laurels of being the world champion in exports and that it was now seeking refuge in the diagnosis, "cost crisis." But, in comparison with this, it is not operating costs that have gotten out of hand, but the fact that German industry has forfeited its lead position in terms of productivity and innovation. To at least be able to see to it that the 1990's yet turn out to be adecade of progress in productivity, industrial firms would have to finally make a determined effort to make more productive use of their workers within a framework of intelligent solutions to problems of technology and organization. She said that accelerated development of innovations, improved market turnover, and greater orientation toward customers are the primary demands being made on German industry. It also has to finally get out of the dead end of "overengineering."

Prof. K.H. Buechel of Bayer, Inc., pointed out that, while there are today 300 genetic engineering production plants in the United States and 120 in Japan, there are only six in Germany. He said that about 270 genetically engineered drugs are at present being clinically tested in the United States, while about 50 in Japan and about 20 in Germany are. There are about 80,000 people employed by genetic engineering firms in the United States, while the projection for Germany comes to exactly 1,000. The structural weaknesses of Germany revealed by these figures have meant a loss of jobs, a sharp decline in scientists' motivation, the emigration of excellent researchers, and lastly the jeopardization of Germany's industrial standing in the domain of the technology of the future, genetic engineering.

Now that the first round of investments in genetic engineering has passed Germany by, we must do everything in our power to create the conditions that will enable us to compete in the second round. Among other things, Buechel called for implementation of the planned revisions of the basic legal requirements for genetic engineering through amendment of the genetic engineering law in a consensus that transcends party lines as well as active promotion of the deregulation of the EC guidelines for genetic engineering.

CORPORATE ALLIANCES

Germany: Mitsubishi To Cooperate With Daimler in Berlin Project

AU0212131693 Munich SUEDDEUTSCHE ZEITUNG in German 2 Dec 93 p 23

["Uhl."-initialed report: "Mitsubishi and Daimler Trying Out Alliance"]

[Text] Berlin—During their three years of cooperation, the Stuttgart-based Daimler-Benz AG and the Japanese Mitsubishi group have concluded six cooperation agreements. Another 35 projects have been considered, 15 of which have been discussed in greater detail. For the heads of the two major enterprises, Edzard Reuter and Shinroku Morohashi, this balance is reason enough to celebrate the fifth top-level meeting as the most successful one of "this business alliance that is unique in the world."

Yet, judged by purely business standards, this Eurasian alliance between the two economic giants is still in its infancy. Thus, at the conclusion of the several days of summit talks in Berlin, Daimler head Reuter would not comment on the direct economic effects of the alliance.

He only said that, at the current state of cooperation, annual expenditure was amounting to 50 million German marks [DM]. However, the tendency was pointing toward DM100 million, an amount that, according to Reuter, might skyrocket at once if more extravagant projects were to be agreed, which were, for example, being discussed in the sphere of aviation and space technology.

Some DM100 million will be spent on the construction of a pilot plant, which will try out the metallurgical recycling of old cars. The Austrian Voest Alpine company is also participating in this joint project. After successful testing, it is intended to sell this procedure not only in Germany, which is where the pilot plant will be set up, but everywhere in Europe. As far as Japan and the Asian region is concerned, the two company heads expect the construction of such plants only in the long term.

The issue of environmental protection also affects the agreement on cooperation for plastic recycling, which has now been concluded. Here, the German partner has a lead in the development for mechanized processing, while Mitsubishi has the chemical know-how. Moreover, the two concerns want to demonstrate their commitment in the growth market of environmental protection in a joint appearance at the "New Earth '93" environmental fair (7-10 December in Osaka).

In Reuter's view, the license agreement between the Daimler subsidiary Temic Telefunken Microelectronic GmbH and the Mitsubishi Electric Corporation constitutes a "milestone" in cooperation. It will give Temic access to the so-called CMOS [complementary metal oxide semiconductor] technology for the production of highly efficient integrated circuits. The Daimler head believes that this is "know-how for the next millennium."

The two partners are pursuing immediate commercial interests for the assembly and the sale of the small Mitsubishi L200 pick-up truck by Mercedes-Benz of South Africa. This type of truck has so far been offered only by Toyota and Nissan in South Africa. Reuter and Morohashi believe that the Mitsubishi truck will have a good chance on the market there. Moreover, it was being planned to develop a new electronic gear-box and to streamline the organization of existing production procedures by including the subcontractors.

Treat for Berlin

To improve the understanding for the differing philosophy of the two companies, the two executives agreed on joint management seminars and the exchange of an employee between Tokyo and Stuttgart. As a special treat for Berlin, Reuter announced that the Japanese concern intends to participate in Daimler Benz's construction project in Potsdamer Platz. According to Reuter, Mitsubishi has expressed its readiness to act as general contractor for one or more buildings.

CORPORATE STRATEGIES

France: Power Electronics Industry Dwindles

BR0712151193 Paris ELECTRONIQUE INTERNATIONAL HEBDO in French 25 Nov 93 p 11

[Article by Jean Pierre Della Mussia: "France Abandons Power Semiconductors"]

[Text] After several halts in French production of semiconductors for power electronics, April 1992 saw the launch of a project to create a company integrating the assets of our last remaining major players in the field. The project has just collapsed.

It could not last: For instance, SGS-Thomson has sold its high- power semiconductor business back to the British company MEDL [Marconi Electronic Devices Ltd.]; Powerex Inc. has taken manufacturing back from its Massy subsidiary; SGS-Thomson's medium-power semiconductor business has left Aix-en-Provence for Italy, and so on.

In April 1992, Michel Amiet, president of the Electric Engineering Interministerial Mission, took the initiative of recommending the merger of the last remaining major French players in power semiconductors, Powerex, Telemecanique, and Power Compact. His aim was to set up a new company, Aspec, dedicated to producing advanced high-power semiconductors. The project was backed from the outset by "major corporations" (SNCF [French Railway Company], RATP [Paris Public Transportation Authority], EDF [French Electricity Company], etc.), and was "more or less" supported by state bodies, despite their continued reluctance to encourage projects where "encouragement" all too often means "subsidy." In October, however, the project was abandoned, the reasons being a lack of any real interest in industry on the part of potential shareholders; and insufficient conviction on the part of high-power electronics users that the performance of their future products would depend on advanced semiconductors, almost all of which are manufactured in Japan by companies such as Mitsubishi and Toshiba, which are rivals of French equipment manufacturers. October saw the sacrifice of the long term to the short term.

Yet things seemed to be going quite well for Aspec during 1992, when Telemecanique decided to halt developmental work on silicon components at its Nanterre laboratory, and Power Compact was pursuing objectives at odds with those of its parent company, Valtronic, which was planning a separation. Finally, the decision was made to transfer production from Powerex Massy to an American factory. This gave rise to the basic idea of the Aspec project, i.e., to integrate the three activities and make them the core business of Aspec, which was to have three objectives: The production in France of components whose users would include French manufacturers; development of Power Compact's business in powerful integrated modules intended for industrial, professional and military use; and further development

of new types of components. Thus, thanks to the assets accruing from the three companies, the new capital needed would have been limited to around 20 million French francs, while the company would have had strong material and human resources immediately it was incorporated, with short-term profitability also guaranteed from the start.

Potential Shareholders Insufficiently Motivated

Failure to establish the project as an industrial initiative was undoubtedly a mistake: Despite their enthusiasm, the mission of institutional investors is not to become industrialists, and some of the five ministries concerned—Industry, National Education, Research, Defense, and Transport—did not hold the line (Industry, for example). In addition, it needs to be added that the major French groups using power electronics did not wish to acquire stakes in a company conducting pilot production runs or producing sets of specific components which could benefit their rivals. At the same time, medium-sized user companies presently have other priorities than investing in the production of components of which there does not seem any immediate shortage. The target date for incorporating the new company was set for mid-October, at the time when Powerex Europe was to start its transfer to the United States, while Telemecanique could no longer sustain its unprofitable though saleable product range, and Valtronic wished to sell Power Compact. Thus, the deficiencies in potential shareholders' motivation was the clear cause of the failure of the project.

France: Matra MHS Doubles, Upgrades Semiconductor Activities

BR0812134893 Paris ELECTRONIQUE INTERNATIONAL HEBDO in French 25 Nov 93 p 12

[Text] In June, Matra MHS started expansion works at its Nantes factory which should enable it to start using 150-mm wafers. As a result of this, it should double current production capacity, on the one hand, and to start producing 0.5-micron technologies, on the other. The planned expansions will be "class-1" and "subclass-1" clean room facilities, i.e., suitable for future 0.35-micron technologies. To finance this expansion, Matra MHS has earmarked 500 million French francs [Fr] spread over the next two to three years.

Since 1985-86, Matra MHS possesses 2,000 square meters of class-10 clean rooms, which have enabled it to develop and subsequently produce 0.85/0.7-micron CMOS [complementary metal-oxide semiconductor] and BiCMOS [bipolar CMOS] integrated circuits. After the expansion in early 1994, total clean room area will reach 3,000 square meters, including one-third of class-1 quality. The remaining two-thirds of nonclass-1 clean room area will be based on the SMIF (standard mechanical interface for clean, robotized mini-environments) approach, thus ensuring class-1 cleanliness of the production equipment.

The factory's production capacity is expected to rise to 150,000 150-mm wafers per year. Compared with today's output of 130,000 125-mm wafers per year, this implies an "quasi-doubling" of capacity, as initially announced by the company.

During the first expansion stage, a research and development program will be launched with the following goals:

—Optimize the clean room area to produce a wide range of products using multiple technologies;

—Test and develop equipment suitable for 200-mm-wafer production;

—Identify technological convergences with other TEMIC [Telefunken Microelectronic, Matra MHS' parent company] branches (Siliconix, Telefunken);

—Modernize production management;

—Study 0.35-micron technologies.

If current economic data and projections remain unchanged, these investments should enable Matra MHS to pass the Fr1-billion-turnover mark as of 1996, i.e., a 50-percent increase over the Fr700-million 1993 figure. Matra MHS anticipates having a staff of 1,000 by 1996; today, it employs some 860 people at its Nantes plant and in its technical support centers and sales agencies.

Matra MHS' sales are expected to increase by 10 percent in 1993.

Germany: Daimler-Benz President Outlines Aims

AU2611201093 Duesseldorf WIRTSCHAFTSWOCHE in German 26 Nov 93 pp 170-173

[Interview with Edzard Reuter, president of Mercedes-Daimler-Benz, by Stefan Wichmann; place and date not given: "The Pain Threshold Has Been Reached"]

[Text] [Wichmann] Mr. Reuter, under your management Germany's flagship company has been listing heavily. You have spent eight billion German marks on buying companies outside the automobile sector to diversify the concern. What is left of your dream to create a powerful technological concern?

[Reuter] I have achieved my goal. Today, Daimler-Benz is an integrated technological concern. With the structure that we have created over the past few years, we are ready for the future. There is no other approach that we could adopt if we had to do it again. That we are going about things the right way was recently demonstrated by the positive response to our flotation on Wall Street.

[Wichmann] However, all the facts clearly indicate that you intend to part with your troublesome children and concentrate on your core business, cars.

[Reuter] There can be no question of that. Our analyses and plans for the reorganization of AEG [General Power

Company]—incidentally, they were not just prepared yesterday, but have been produced over two years—have now been completed. We are now drawing the appropriate conclusions, which does not mean that we are withdrawing from essential core businesses.

[Wichmann] But would it not be better to invest that money in expanding the car business?

[Reuter] That is a statement that is being continually repeated, which does not make it any more correct. All I can say is that Mercedes-Benz has not spared a penny with respect to essential investment, whether it be in development, production, or the modernization of sales.

[Wichmann] Your rival BMW has overtaken you in the meantime. Which area of the concern gives you the greatest headaches?

[Reuter] We are currently on the point of overtaking. Dasa [German Aerospace Company] and Mercedes-Benz do, of course, face enormous pressure from international competition. Within 24 months, by 1994, we will have shed 40,000 jobs at Mercedes-Benz. At Dasa, 10,000 jobs will go over the same period of time. These are rationalization measures that are essential to bring costs down to a competitive level. We also have problems at AEG and Debis, where we are continuing to try to tackle overheads.

[Wichmann] So, you are applying drastic remedies that are long overdue?

[Reuter] Yes, these are painful measures that are being accelerated. However, that is also the second reason why Daimler- Benz has been judged so positively on Wall Street. The analysts there have noted that this is a concern that not only talks, but also acts. Daimler-Benz, like all German companies, has put on too much weight over the past few years.

[Wichmann] Why did you fail to notice the signs of an impending crisis sooner and act accordingly?

[Reuter] We were certainly too slow in some respects. Many things that we should have done, we could not do in a period when it was believed that one had unrestricted rights to all manner of things. Now, however, with the growing pressure of competition, the unions increasingly realize that antiquated customs must be done away with.

[Wichmann] What antiquated customs are you doing away with at Daimler-Benz?

[Reuter] In production, for example, we permitted ourselves luxuries in the form of social fringe benefits that we can no longer afford today.

[Wichmann] Quite a few mistakes on the part of management have also played a role.

[Reuter] That is certainly also the case. We sat on our products too long and were confident that if they bore the words "made in Germany," they would sell at a high prices of their own accord. We made the necessary adjustments too slowly over a lengthy period of time. The result is that competitors have in the meantime begun to close in on us in world markets.

[Wichmann] Have you not been banking on the wrong products? In the case of your "S"-series, you have to give politicians super discounts to get rid of them. Many companies find the car is too flashy.

[Reuter] One can see things that way to some extent. However, the "S"-series is a great success wherever it is sold outside Germany. That is also true of China, for example, where our sales have trebled this year. In 1993, we sold almost 5,000 "S"-series cars there all together.

[Wichmann] The Daimler-Benz subsidiary Dasa in the aerospace sector is losing markets with the end of the Cold War. Have you not made a gross miscalculation in this respect?

[Reuter] You should take a more differentiated view of the markets. First of all, in the long term, civil aviation will be one the largest growth markets, even if it currently finds itself in a serious crisis. I am not trying to engage in some kind of faith-healing. Further, no one has any doubts that in in the medium term, aerospace will involve important future technology. Just take a look at Japan, the United States, China, or France, where there is large-scale investment in aerospace technology. It is only the Germans with their petty-minded way of thinking who are hesitating. Aerospace is definitely one area of the concern that has great growth opportunities.

[Wichmann] Because of the constraints of empty coffers, Europe's ambitious space plans have been nothing but scrap paper for a long time now.

[Reuter] Currently, the debate in Europe about the role of individual states is very difficult. However, I think that in the meantime, German politicians have come to realize that the great potential that has been created in Germany in terms of people and know-how cannot be allowed to go to waste simply because of short-term budgetary considerations.

[Wichmann] Research Minister Paul Krueger has just reduced his space budget for next year.

[Reuter] Nevertheless, the level will be sufficient for us to retain our knowledge. In addition to orders placed by the state, there are a whole series of other commercial fields in which we are very successful. They include the Ariane rocket project in which we are involved. Last week, Dasa established a joint venture in China for the development and sale of communications satellites. We have also done the same thing in America. Aerospace technology is an international business and I see great opportunities abroad.

[Wichmann] That no longer applies to the defense field. Or are you hoping that the defense budget will once reach the astronomical levels of the past?

[Reuter] I was never of that opinion. At no time have I justified the expansion of the concern by counting on growth in the defense sector. On the contrary, we have always said that we want to contract in that area.

[Wichmann] Do you not have to react more rapidly?

[Reuter] No one could have predicted the dramatic drop in public procurement budgets. In addition, that is not the only reason. The Defense Ministry has gone about things using a kind of lawnmower approach without a recognizable concept of what the future tasks of the Bundeswehr should be and what equipment it needs for those tasks. If that is not rectified, then we really will have to remove the defense industry from Germany. Nor will our company any longer be able to work in this field in Germany.

[Wichmann] Are you doing what critics of your technology concept have always been saying: If the calculations do not work out, then you call for state assistance?

[Reuter] It is scandalous that no decision has been made on such an important defense policy element as the Eurofighter 2000. If a decision is not made soon, we will have to shut down the appropriate capacity, because we cannot afford the costs of maintaining the necessary capacity endlessly. No one, for example, disputes the fact that, for example, NATO needs a new aircraft for transporting troops. But no one is making a decision about whether it should be developed or not. It is not as much a question of the volume. We can be geared up for any volume. However, the politicians must finally say what the volume should be or whether they want to abandon it altogether. We have reached the pain threshold.

[Wichmann] And that also applies to your services subsidiary Debis?

[Reuter] This year Debis once again increased its total sales by 25 percent. That is a success to be proud of at a time when German industry is experiencing difficulties. However, we have a lot to do within individual areas of business and in connection with Debis's internal structures.

[Wichmann] Would you develop your one service division once again?

[Reuter] But of course.

[Wichmann] You do not seem to be troubled by self-doubt. So, you do not regret any of your decisions.

[Reuter] There are, of course, decisions that in hindsight I regret. I have definitely made mistakes in connection with AEG. I held on to the AEG Olympia office technology field for too long and even invested in it, because I was of the opinion that it was an area that had a future. Mistakes were also made in Dasa medical technology. However, the basic structure of the concern is sound, and we have things under control—incidentally, we have an excellent management team, and there is hardly a better one anywhere in the world.

[Wichmann] I do not know whether your shareholders see things that way, now that you are proposing a substantial reduction in the dividend.

[Reuter] I will not speculate about that here. Wait to see the balance sheet at the beginning of next year.

[Wichmann] Who would you like to see as your successor?

[Reuter] I would not name a candidate to succeed me even I knew who he might be.

Germany: DASA Chairman Outlines Company Strategies

MI0112135593 Bonn DIE WELT in German 12 Nov 93 p 14

[Interview with German Aerospace Board Chairman Juergen E. Schrempp by Wolfram Baentsch and Ulrich Friese, place not specified, first paragraph is DIE WELT introduction: "DASA Does Not Need Money: It Needs Good Policy"]

[Text] Shrinking business in civial aviation and a massive decline in public defense and aerospace contracts are taking their full toll on German Aerospace AG (DASA) business and results. The Munich-based high-technology group, which made profits of 17.3 billion German marks [DM] last year, will move out of at least nine of its 52 factories over the next three years. The period from 1993 through 1996 will see only 16,000 of the group's current 82,000 jobs fall victim to the red pencil, a moderate staff cut, says DASA chief Juergen E. Schremp in this interview with DIE WELT, because if the Daimler-Benz subsidiary's current excess capacity were cut back to take full account of the desolate situation on the world market, "four or five other locations" would be on the DASA condemned list as well. Wolfram Baentsch and Ulrich Friese spoke to Juergen E. Schrempp.

[DIE WELT] Once upon a time, the Daimler-Benz group and its subsidiary, DASA, stood for a vision of the broadly diversified technology combine, but the constant stream of bad news from Stuttgart and Munich inevitably gives the impression that what it really exemplifies is the shattering of visions.

[Schrempp] Our visions are definitely not shattered. We must draw a clear distinction between the group's long-term strategy and the structural and recessionary problems from which business is currently suffering.

Regardless of these problems, we have achieved our target of a strategic positioning on the world market—within three years—in an outstanding manner. The German aerospace industry, which was extremelyly fragmented until DASA was founded at the end of 1989, has been turned into a leading European aerospace group that ranks top in the four core areas: aviation, space,

defense technology, and aircraft engines. We are also much sought after worldwide as joint venture partners.

[DIE WELT] DASA has nevertheless taken the lead in reporting high losses as well ...

[Schrempp] The red figures that we shall have to enter in the financial reports for 1993 and 1994, two difficult years, are largely due to structural adaptations and the setting aside of reserves to cover staff reduction expenses. If it were not for these extraordinary liabilities, we should be in the black. Once we have achieved the cost reductions recently announced, we shall show an operating profit in 1995.

[DIE WELT] Will the billions that DASA has budgeted each year for research and development expenditure remain untouched, even if the political scene does not change in your favor?

[Schrempp] We want to safeguard the future of our group by raising our self-financed R&D expenditure by about 22 percent in the medium term—this means more than a billion a year. Whether or not we have to review the scale of our plans will depend on whether the framework conditions in which the German aerospace industry operates come closer to those that our competitors enjoy. If there is no change in our favor in competitive conditions, which, for instance, currently bias the market toward American or Japanese aircraft manufacturers, we shall indeed be forced to relocate activities to areas where the requisite conditions prevail.

[DIE WELT] Does that mean that you are calling for additional subsidies?

[Schrempp] It is not a question of subsidies. What we need is a national technology policy that takes account of the framework needed to compete on a global scale. I cannot say often enough that DASA has no liquidity problem; it just wants to maintain the promise that the German aerospace industry holds out for the future.

[DIE WELT] You are now ruthlessly pruning capacities in the aviation and defense divisions. Would less drastic measures have been sufficient if DASA had not expanded in such a rush before?

[Schrempp] It is a historical fact that this country has installed an enormous defense and aircraft production capacity for defense and structural policy reasons. DASA currently has over 52 factories, distributed throughout nearly all the federal laender—obviously too many. Had we really been as ruthless as you say, we should have had to close at least four or five other works, some of them in eastern Germany, over and above the nine factories from which DASA has decided to withdraw to date. However, if the group makes a profit from 1995 onwards with the remaining factories, providing about 70,000 highly skilled jobs, we shall also have performed a service to the community.

[DIE WELT] The minister-presidents of the laender affected, group chairman Edzard Reuter, and yourself are due to attend a summit in Munich on Friday to discuss the planned works closures. Can the various rescue attempts at political level change DASA's course of action?

[Schrempp] The Free State of Bavaria, which is still a DASA shareholder, acknowledged early on that our package of measures was essential to maintain DASA's competitiveness. The laender of Lower Saxony and Bavaria have also let it be known that they are willing to grant us financial aid if necessary. However, I must repeat that our problem is not one of liquidity but of our own structure and the framework conditions in which the aerospace industry has to operate in Germany. After intensive in-house surveys lasting several months, I still see no alternative to our structural concept. However, I am greatly looking forward to hearing the minister-presidents' proposals for improving locational conditions for our industry so as to avoid further painful cuts.

[DIE WELT] Can a way be found out of the DASA crisis via a four-day week or other, more flexible, forms of work schedule?

[Schrempp] Provided we have a competitive cost structure, I am in no way opposed to flexible patterns of work, but I should first like to wait and see how the much-vaunted work schedule model at Volkswagen works out in actual practice. We do not rule good ideas out as a matter of principle.

[DIE WELT] The workforce still voices doubts as to your reasons for closing factories and cutting jobs, claiming that the DASA factory threatened with closure in Lemwerder has been working at a profit.

[Schrempp] That is not true. In the current year alone, Lemwerder will report losses of about DM35 million. It services large aircraft, and this is no longer feasible, except with high losses, in Germany, where wages are high. We are therefore moving out of this business.

[DIE WELT] Where has DASA actually succeeded in achieving the much-invoked internal synergies needed to offset sources of loss?

[Schrempp] A wide variety of measures have been implemented over recent years, reducing the cost level by about DM1 billion. At the same time, we have used defense technology know-how to build up new, attractive areas of business that will bring us a medium-term income of about DM2.5 billion and provide around 2,500 jobs.

[DIE WELT] DASA's aviation division presents another lopsided picture, the reasons probably including sluggish sales of the Dornier regional aircraft. So how can the massive investments in the Do-228 and Do-328 models be "flown in"?

[Schrempp] As the cost accounts must balance in the aircraft sector too, we are thinking of joining forces in the long term with a strong partner that could use the Dornier aircraft as a complement to its own range. The options range from greater involvement in DASA's Fokker business to a joint

venture with ATR [air turbo-ramjet] or overseas manufacturers. The Do-328 is in any case the most advanced turboprop aircraft in the regional range.

[DIE WELT] Your other business, as you call it, which has come under the DASA umbrella since the MBB [Messerschmitt-Boelkow- Blohm], Dornier, MTU [Engine and Turbine Union], and TST [Telefunken Systems Technology Company] merger, is now all being hived off. Will the sale of Dornier Medical Engineering that you are negotiating with Jenoptik chief Lothar Spaeth be concluded in the near future?

[Schrempp] Jenoptik has a strong interest in becoming the majority shareholder, but we shall be staying on board as the minority partner. The accountants are currently drawing up their evaluation report, and we shall start negotiations as soon as it is ready. The prospects for a positive outcome are good.

[DIE WELT] Next it will be the turn of the naval engine division, MTU in Friedrichshafen, to take its leave of the DASA grouping. Are any other switches from one branch of the Daimler-Benz group to another on the cards, in connection with relevant AEG business, perhaps?

[Schrempp] The major hurdle has already been cleared: Pratt & Whitney is now a legally independent business unit, so we can accomplish cross-participation, as planned, at the beginning of 1994. The four-way partnership to develop a new engine for business aircraft is at the planning stage. The division of work within the venture has already been decided. We are thinking of bringing in a fifth engine manufacturer, probably from Asia, as a "risk and revenue-sharing partner."

[DIE WELT] Mr. Schrempp, does your target of bringing the DASA group into the black by 1995 by any chance have anything to do with Edzard Reuter's departure as head of Daimler-Benz? Is the crown prince grooming himself for the succession in the role of radical reformer?

[Schrempp] The cuts at DASA are an urgent necessity in terms of business management. The work involved leaves neither time nor energy for personal career considerations.

Bull's CEO Replaced, Firm's Privatization Discussed

94WS0044B Paris LE MONDE in French 19 Oct 93 p 20

[Article by Caroline Monnot: "With a New Chief Executive Officer [CEO], State-Owned Computer Manufacturer Bull Also Gets a Large Subsidy"—first three paragraphs are LE MONDE introduction"]

[Text]

The State Is Taking Bull Back in Hand

On Monday 18 October, Gerard Longuet announced that Jean-Marie Descarpentries was replacing Bernard Pache. Both the dismissal and the appointment show the government's determination to put an end to the chronic deficits of the state-owned computer manufacturer. Giving up the dreams of the Computer Plan, the State agrees to turn Bull into a middleweight computer company.

Bernard Pache Falls After Four Months of Disagreements

In spite of the 6,500 layoffs to which he resigned himself at the beginning of last summer, the CEO refused to throw back into question the integrity of the group of which he had assumed control in June 1992.

Jean-Marie Descarpentries in Charge of Privatization

The former star manager of the eighties must turn Bull into "a more profitable, more efficient, and more mobile company, with greater emphasis on customer service." This used to be one of his articles of faith. But he will have to give up the race to growth that caused him to be dismissed from Carnaud-Metalbox [CMB] in September 1991.

At a press conference held on Monday 18 October, Gerard Longuet, minister of industry, announced that Bernard Pache, the current CEO of the Bull group, was replaced by Jean-Marie Descarpentries, former CEO of the CMB-Packaging group, dismissed in September 1991. The State will also provide seven billion francs [Fr] in capital grants at the end of 1993 and in 1994. This amount, to which should be added the Fr2.5 billion granted earlier this year in the form of shareholders' advances, will bring the State's total effort in favor of Bull to Fr9.5 billion over two years. According to the minister, this considerable recapitalization, which he claimed will be the last one, will "enable the group to be privatized as soon as possible, after the necessary recovery."

"Bull is a dinosaur. When you tread on its tail, the CEO is not aware of it. And when the CEO gives an order, that order is reflected by middle-management layers and comes back to slap him in the face; it never reaches the rank and file," a high official at the Ministry of Industry explained recently, somewhat tired of the ritual succession of losses and measures of recovery. Losses of Fr15 billion over the last three years. The same amount in capital grants. Acquisitions (that of Zenith Data Systems in 1989) made at the wrong time; headline-making alliances (partnership with IBM in 1992) that are impossible to evaluate; mutation plans that did not basically provide a new deal. "Bull needs a major cleaning up," he observed severely.

With Bernard Pache's departure and his replacement by Jean-Marie Descarpentries, an apostle of "modern management" and a great theorist of the inverted pyramid—a corporate organization form that was popular during the mid-eighties, in which "the base, being in contact with customers, takes precedence over the summit, which is more remote"—the supervising ministry is attempting one last bet: on cultural shock. After "the visionary stratagem" personified by Jacques Stern, "the finance man" symbolized by Francis Lorentz, "the expert in restructuring and social development plans" incarnated in Bernard Pache, the choice now falls on the American-type "one-minute manager."

Mr. Descarpentries' mandate is clear. The Bull group—for the last time in its history—will benefit from strong recapitalization. The State will inject in it no less than Fr9.5 billion over two years (1993 and 1994), in the form of a capital increase. France Telecom, the U.S. company IBM, the Japanese company NEC—which together hold the 28 percent of Bull not owned by the State—were "invited to participate" in the operation. Until now, IBM was reserved; officially, NEC has not made its position known. France Telecom, according to Mr. Longuet, has given its agreement in principle.

The amount granted by the State exactly matches Bull's debts. Fortified by this "present," Mr. Descarpentries was given the task of getting Bull out of the red as rapidly as possible (i.e. by 1995), thus paving the way for its privatization.

Mr. Pache's departure, at any rate, tolls the knell of one ambition: that of preserving a large French general computer manufacturer. The national-champion policy, which proved efficient in other sectors, regularly failed in the case of computers and Bull. It did so for two reasons: First, because of the specific characteristics of the sector. Unless it has considerable financial power, no group can now aspire to do it all: sell technologies, manufacture the entire range of hardware (from large systems to micro and minicomputers), and provide services. Second, Bull, whose rocky past was a succession of changes of shareholders, mergers, and acquisitions, never had a structure suitable to cope with the (now extremely rapid) changes taking place in the computer world.

Restoring Bull's balance as quickly as possible will now require making radical choices of activities, positioning the group in a number of carefully selected sectors (for instance, the question of whether Bull should remain in the microcomputer sector should be clearly formulated) without frightening customers and employees who were already given quite a rough time in recent months. In a letter published on the very day when his appointment was announced, Jean-Marie Descarpentries made a point of reassuring the company's partners. The dream of the Computer Plan has vanished for good. The State has resigned itself to turning Bull into an average player in the computer industry.

France: Rhone-Poulenc Privatization Planned

94WS0044A Paris LE MONDE in French 20 Oct 93 p 20

[Article by Caroline Monnot: "Eleven Years After the Nationalization of the Chemical Group: End of a 'Parenthesis' for Rhone-Poulenc"—first paragraph is LE MONDE introduction]

[Text]

Rhone-Poulenc, First Industrial Group to Be Privatized

The chief executive officer [CEO] of Rhone-Poulenc, Jean-Rene Fourtou, counts on the full privatization of his group to gain more room to maneuver, reduce the group's debt, and pursue its growth policy. In the immediate future, Rhone-Poulenc will acquire stable shareholders holding 25 percent of its stock and including its current large shareholders: AGF [General Insurance of France], Credit Lyonnais, BNP [National Bank of Paris] and Societe Generale. The insurance group AXA might join them but, contrary to Mr. Fourtou's wishes, the new shareholders will not include an industrial group.

Rhone-Poulenc decided to have an uneventful privatization, which was officially announced on 18 October. This is a nice sign of faith in the markets and in the company considering that, contrary to BNP which could rely on its network to sell shares, Rhone-Poulenc, the first industrial group to be privatized, will have to rely on its power of attraction alone to tempt potential investors.

In spite of this, the chemical group does not view the operation as an exceptional event. "Privatization was far more important for BNP because it is a bank, and because it was a state-owned company par excellence. As for us, we were nationalized in 1982. We are returning to the private sector. We are merely closing a parenthesis of 10 years or so," the chemical group management explained.

During these 10 years or so, after facing financial collapse in the early eighties, Rhone-Poulenc restructured itself and reorganized its business portfolio, minimizing the share of its semi-finished products to focus on high-margin specialties. Ranking seventh among chemical manufacturers worldwide, after spending close to 40 million francs [Fr] on the acquisition of some 30 companies, including the U.S. pharmaceutical company Rorer, Rhone-Poulenc (Fr81.7 billion in sales; 83,300 employees) withstood fairly well the chemical sector crisis, with increased profits in 1991 and 1992.

The outlook for 1993 is not that good. During the first half-year, all branches of activity—especially fibers and polymers on the one hand, and organic and mineral intermediates on the other hand—saw their operational margins drop sharply (-15.7 percent overall). As for the net result, it was 13.5 percent lower. For the year as a whole, the chemical group now expects its profit to be less than the Fr1.5 billion achieved in 1992.

Heavily in debt (its total liabilities—Fr33 billion—amount to 80 percent of its equity), Rhone-Poulenc counts essentially on privatization to gain more room to maneuver. An excellent illustration of this is the planned takeover of the Merieux Institute, the world leader in vaccines in which, until now, the chemical group had a 51-percent interest. The operation, which will involve an exchange of stock, cannot be carried out as long as Rhone-Poulenc is a state-owned company, as this would dilute the State's equity in the group.

Contrary to the wishes of CEO Jean-Rene Fourtou, the new Rhone-Poulenc shareholders are unlikely to include an industrial group. Societe Generale publicly vowed to strengthen its position. And the AXA insurance group can also be expected to join the new board of directors, with a significant number of shares.

France: Rhone-Poulenc's Extra Self-Financed Privatization Proposed

94WS0094C Paris LE MONDE in French 8 Nov 93 p 13

[Article by Dominique Gallois: "Rhone-Poulenc Management To Ante Up for Privatization"]

[Text] Taking advantage of plans to privatize Rhone-Poulenc, its president Jean-Rene Fourtou is asking the group's managers to spend the equivalent of a year's salary to buy shares in the company. "I have always thought that if top management does not have a direct stake in a company, it does not work," he explains to justify his call. The idea comes from Fourtou's previous experience as the director of the consulting firm Bossard. There every manager is required to become financially involved by purchasing stock in the firm, whetting their motivation. "Why shouldn't something that has proved vital to a services firm benefit a manufacturing company as well?"

In Rhone-Poulenc's case, the requirement affects the 50 members of its orientation committee, both in France and abroad. The committee is the company's second ring of decisionmakers, each of whom is responsible for a chemical or pharmaceutical sector with sales of over one billion French francs [Fr]. "Since 1987, we have been meeting three times a year for two days to discuss the group's development. This has created some very strong bonds between us," says Jean-Rene Fourtou. "Besides, I consider these managers partners, not subordinates."

Fourtou's plan to involve management directly in the company's capital has nothing to do with stock options, which allow personnel to buy or subscribe company shares at a preset price. It will be a firm and wholly unsymbolic investment, often involving nearly Fr1 million or more. "If they can save, why wouldn't they buy—besides an apartment—shares in Rhone-Poulenc?" asks the group's president. Aware of how much he is asking of his managers, Jean-Rene Fourtou envisions a gradual investment staggered over several years, and involving a minimum starting purchase of 4,000 shares, or about Fr450,000.

The managers will be able to take advantage of special privatization offers that allow workers to acquire shares worth up to Fr749,100 at favorable terms. The remainder will then have to be bought on the Exchange. All of the shares will reportedly be pooled in an association.

Every manager will be required to hold on to his stock until he leaves the group. And the requirement will not be a one-time measure either, for "In the future, all new members of the orientation committee will have to meet the same obligation."

EAST-WEST RELATIONS

European Affairs: France Telecom Participates in Russian Joint Venture

BR0712094893 Chichester INTERNATIONAL TELECOMMUNICATIONS INTELLIGENCE in English 1 Nov 93 pp 4-5

[Unattributed article: "Russia-France Telecom to Participate in 'Project 50x50'"]

[Text] On October 25th, France Telecom agreed to join an international consortium being initiated by Rostelecom, the Russian national and international telecommunications operator formerly known as Intertelekom. Rostelecom's plan is for a number of western telecommunications companies to cooperate in the development of an international long-distance, national long-distance and local digital telecommunications network for the Russian Federation.

In July, Rostelecom's first potential partner was identified as Deutsche Bundespost Telekom [DBT] when the two operators signed a Memorandum of Understanding on the project.

The venture, known as "Project 50x50", calls for the creation by the year 2005 of a digital overlay network linking the main cities in the Russian Federation. This network will comprise nearly 50,000 km of digital long-distance lines and about 50 intercity transit centres, as well as a number of urban and rural subscriber switches. It will cost an estimated $1 billion to build the network and take 10 years to complete.

Rostelecom will retain majority ownership of the new venture, with France Telecom, DBT and any other western companies that decide to participate taking minority interests.

France Telecom said it is currently working with Rostelecom on a strategic plan which will define the technical and economic parameters for the project.

United Kingdom, CIS: CIS Institute Licenses Titanium Technology to UK Firm

BR0712095593 Toddington NEW MATERIALS INTERNATIONAL in English Nov 93 p 1

[Unattributed article: "Bunting Signs Welding License With Paton"]

[Text] Bunting Titanium, based in Birmingham and one of the UK's most experienced fabricators of titanium, has negotiated an exclusive license with the largest single welding institute in the world, the E O Paton Electric Welding Institute of Kiev in Ukraine.

The agreement signed by Bunting's managing director, Ray Portman in Kiev, gives Bunting the exclusive manufacturing and distribution license for the tooling and welding consumables utilised in once secret welding

techniques. These were developed by Paton to weld titanium in military and aerospace and outer space applications.

The technique can triple the depth of penetration achieved with conventional TIG [tungsten inert gas] welding and increase productivity 10 times.

The agreement follows 15 months of negotiations and several visits to the Ukraine.

Portman said: "This license is a major coup for Bunting Titanium. We were the first western company to spot the potential and show the initiative to obtain the license. It will dramatically improve our productivity, and further the use of titanium in areas where previously it was thought too costly."

The agreement allows Bunting to work in the UK and Scandinavia and will extend, over the next 12 months, to the whole of the EC. Further welding techniques developed by Paton will be passed on to Bunting under the terms of the license.

France, CIS: French Missions Evaluate CIS Military Research

BR0212091793 Paris L'ARMEMENT in French Jul-Aug 93 pp 58-66

[Article by Patrice Desvergnes, chief armaments engineer at the Defense Ministry's Research, Studies, and Technologies Directorate: "A Night in Yurga"]

[Excerpt] [passage omitted describing the trip to Yurga] For us, experts from the General Armament Delegation [DGA], the adventure is recent and actually only dates from a year and a half ago. This was the main sequence of events:

—The abortive coup of August 1991 sparked off a cascade of events which led to the breakup, in December, of the Soviet Union, the birth of 15 nations in its place, and a federative structure, the Community of Independent States (CIS). It is in the context of this new entity—neither the extent nor the prerogatives of which are completely defined even today—that the scientific and technological cooperation which is our subject-matter was to develop;

—In January 1992, the French Defense Ministry, joined by the minister of research and space, sent a letter to the prime minister to inform the latter of their intention to implement cooperation with the CIS, in association with French manufacturers and laboratories. The motives for this were manifold: The concern to safeguard and develop a considerable scientific and technological potential, accumulated over decades and threatened with dispersal; the wish to assist with the integration of organizations and research workers into international scientific circles and thus further the transition of the new nations toward a Western-type economy; finally, and more prosaically, the desire to help our own companies and research organizations increase their S&T capability and not remain absent from a part of the world which is in a state of upheaval but which is felt to be full of potential.

—On 13 March, a dozen of the largest manufacturers working for the Defense Ministry received a letter from the minister encouraging them to explore the new technological opportunities offered by the changes taking place in the East. The DRET [Research, Studies, and Technologies Directorate] was designated as the body within the Defense Ministry which would coordinate this action, to which a budget of 50 million French francs [Fr] was allocated. It would be renewed in 1993.

—In order to maintain coordination with the other ministries involved in initiatives of a similar nature, a Coordinating Committee involving the DGA, MRE [Ministry of Research and Space], MICECO, and SGDN [General Secretariat for National Defense] was created, meeting on a monthly basis. Moreover, to ensure sufficient distribution of information to French manufacturers, a discussion group, the Rostopchine Club, was set up by CEDOCAR [Armaments Documentation Center].

—On 5 May, the DRET director went to Moscow, met General Mironov, the head of Russian armaments policy, and, at a conference held at the French Embassy before some 100 senior scientific decision-makers, most of whom were Russian but some of whom had come from neighboring republics, announced the French initiative.

The DGA's activities will thus develop along four lines.

Better Appreciation of Research Potential

Improving our knowledge of our new partners is achieved by sending missions to the relevant areas or by commissioning evaluation reports from independent experts. The following have thus taken place:

—A materials mission in May 1992 when experts from the DGA, accompanied by a delegation of manufacturers, successively visited 11 institutes, research establishments, and research centers in Russia and the Ukraine;

—Under very similar conditions to those of the materials mission, an optics and optronics mission which visited 17 organizations;

—A mission concerning hyper-frequency tubes undertaken jointly by the DEI [Electronics and Computer Technology Directorate] and the DRET in November;

—A mission on the theme of space technology in December, which involved representatives from the DME [Space and Missiles Directorate], DCAe [Directorate of Aircraft Manufacturing], and the DRET;

—A mission concerning armor and armor-piercing materials in March and April 1993;

—An electronics and data processing mission in April 1993 focusing on the Republic of Belarus;

—A detonation technology mission in May 1993;

—And many more, as the trend today is for meetings between technological experts from the two worlds to become commonplace.

We should take the opportunity to emphasize how much has been achieved in such a short time, and, in listing and describing the themes to marvel at, the quantitative and qualitative improvement in our relationship!

After several dozen trips and several 100 meetings and laboratory visits, what lessons can we learn?

First of all there is the reassuring confirmation that we are really welcome in the CIS. The experience accumulated by several dozen "missionaries" is almost unanimous on this point: Everyone was struck by the warmth and quality of the welcome given to them at the laboratories, companies, and research establishments that they visited. We were touched by the care taken by the local authorities, which are faced with countless difficulties and are in an extremely difficult financial situation, to welcome our delegations by calling on the biggest names in Soviet science. The visitors were often surprised to be presented, at their first working meeting in an institute, with a learned assembly of scientific authorities of the highest level which generally included a large number of academicians, even a Nobel Prize winner!

The second confirmation, which was generally expected, involved the technological infrastructure in the former Soviet organizations: more than 1.5 million scientific workers (a quarter of the worldwide total), divided among 5,000 institutes. All these "workers" obviously did not have the same standards of productivity or the same equipment as their Western colleagues—and we know how important this is in modern research, particularly where computing resources are concerned—but their intellectual creativity was absolutely remarkable. One can even assert that the insufficiency of computing resources has caused them to push their theoretical thinking further and imagine methods which we are entirely neglecting due to lack of personnel or motivation. Furthermore, the absence of economic constraints as we understand them has allowed them to carry out work along a considerably greater number of lines. These points will be dealt with below in the section on cooperation in the strict sense, but, on the simple level of concrete fact, two major points must be emphasized:

—There exists a certain "family atmosphere" among all these organizations: Even if some of them have benefited, particularly in the last few years, from a favorable treatment which has allowed them to be more lavishly equipped and better maintained, all of them have some characteristics in common from which a visitor can tell straightaway that he or she is in an "Eastern" laboratory. They all operate in a similar environment and they all had to develop the equipment necessary for their experiments by themselves (by lack of industrial infrastructure!). This often gives a hand-made aspect to the experimental equipment encountered, without necessarily being detrimental to the quality of the experiments save for the time and effort devoted to creating this equipment (the lack of communication between laboratories is also at drawback). There is a certain slovenliness in the still rustic design: These laboratories do not consider air conditioning or dust extraction equipment nearly as important as we do (rather archaic clean rooms!).

—The existence of a certain number of centers of excellence and the predilection for specific technologies, which, once again, are found all over the country. It was patently obvious that the research workers showed a preference, for example, for research into materials or optics rather than work on microelectronics or data processing (however, there were original contributions to these fields).

Finally, there is a conviction that it is important to act quickly if we wish to work efficiently with our new partners, for at least two reasons:

—Many of our competitors are also eying the region, and competition to attract the best partners is fierce. The people we spoke to did not miss an opportunity to remind us cordially that they love France and would really like to work with the French, but that we have a reputation for not making up our minds very quickly and for spending a lot of time pondering the question before acting! On many of the visits we made, we were preceded usually by an American delegation, sometimes by a German or Chinese one.

—The situation of scientists and engineers in the CIS is currently dramatic from a financial viewpoint (an average salary of Fr150 per month) and many are leaving their institutes in order to take up more lucrative activities ("business" of a varied and uncertifiable nature in the case of the most resourceful ones!). It is certain that the potential is rapidly shrinking, even in the case of the best laboratories and the most highly qualified research workers. By delaying overmuch, we run the risk of losing our contacts who will have turned to other customers or other occupations.

Inviting Researchers to France

This is already a very old form of cooperation long used by the Research Ministry. What is new is that the number of invitations has increased and, above all, that the Defense Ministry is now directly intervening in this process. As far as we are concerned, researcher selection is based on their renown and their capacity to develop high-technology projects which, moreover, are given priority in our own programs. Furthermore, it has been decided, as a principle of this action, only to invite researchers for a limited stay, with the intention of

emphasizing our wish to work on a medium and long-term basis; by welcoming research workers, the whole relationship between a Russian laboratory and a French laboratory is strengthened.

How are the research workers singled out and chosen? They can be invited by the French party (a manufacturer or government laboratory) either because they were known in their field through symposia or publications, or because, after site visits and in joint agreement with the CIS organization, they seem the most likely to contribute to a project. In 1992, some 20 research workers have thus been invited by the Defense Ministry for stays lasting three to 12 months.

Where do these research workers go? They can be accommodated in an industrial or university environment. Security and confidentiality problems must be resolved on a case by case basis, but it is quite obvious that, where high technologies with dual-use applications are concerned, such problems remain unavoidable and require original solutions. The research workers are paid a salary ranging from Fr10,000 to Fr20,000, depending on how well they are known (the Defense Ministry invites only experienced research workers, never beginners). The DGA contract is transferred to, according to the circumstances, the host laboratory or an organization specializing in hosting trainees. The predominant aspect of the contract concerns the description of the work to be carried out and not the stay itself.

How is this initiative perceived by our partners? Obviously it is considered good by the research workers themselves, but it is also viewed favorably by their institute, which appreciates the exposure and renown which international cooperation ensures for its laboratories. The fact that we have tried to get scientists to work at their specialist subject and not to "convert" them is, in particular, very much appreciated.

What is the contribution of these research workers? Extremely positive in most cases: Not, as one might think, because "they do not cost much," since once in France they are treated as the equals of their French colleagues, but because our guests have much to teach us thanks to their experience acquired in their own projects, although they are carried out in a very different fashion from ours. As far as we can judge from the experience accumulated with dozens of scientists invited to France in the last few years, their creativity—expressed in terms of publications and patents—is greater than is usual in this field. Finally, they are very motivated, which goes without saying, because they finally feel able to demonstrate their abilities and to capitalize on many years of research work which for the most part has remained untapped and anonymous.

Purchasing Technology

Along with invitations to research workers, purchasing technology is at the center of the new relationship which is being established with the CIS. However, we should make it clear that as far as the DGA is concerned, it is a question of purchasing technology in accordance with the following guidelines:

—The ex-Soviets are offering technologies of which they have an overabundance; they demand financial contributions, equipment, help with restructuring, or manufacturing agreements;

—We purchase technologies because it is our ambition to remain in high-technology sectors and for this, we must constantly master new technologies whose development costs might be extremely high and exceed our funding capacity. Even for today's systems, we are far from mastering, at the national level, all of the technologies required by their components, which we are obliged to buy, sometimes at a very high price, from outside sources. The acquisition in the CIS of the necessary technologies for a reasonable price gives us extra advantages.

Purchasing technologies in the CIS, however, raises specific questions of which we will give two examples:

—The adoption of a new technology can cause problems with respect to our own development programs, which were drawn up well before the East was opened up: Much effort has been spent and much money invested to implement technological procedures which may be called into question by the new opportunities. The repercussions on employment and the risk of dispersing specialized teams must thus be evaluated very seriously before such operations are embarked upon. This type of problem is primarily encountered in a field where the Defense Ministry is not the only body which decides: The space sector, as well as the range of technologies available in the CIS, is extremely broad and enticing.

—Acquiring a technology is not the end of the matter: It must still be standardized and integrated into our range of technologies. The cost incurred can be high and may reduce the overall financial advantage of the operation: Laboratories in the CIS are overflowing with technologies in an "almost operational" or prototype stage (even manufactured in very great quantities!), but their approach to standardization and reliability has been very different to ours and justifies further adaptive work. These technologies have been developed using their own equipment, often very well suited to local production requirements, but which must be completely rethought to fit the Western environment.

Whatever the case may be, many operations launched as part of the initiative concern evaluations of CIS technologies. This is an indispensable stage before an acquisition is decided upon. Under the heading of its development fund, the DRET has supported a number of these operations, as long as part of the evaluation or adaptation work was allocated to the CIS partner.

Cooperation on Subjects of Mutual Interest

The most ambitious aim of the French initiative is to lead up to medium or long-term cooperation: first through the development of technology and then—why not?—of components and even equipment.

With the new economic situation in the CIS and the drop of around 90 percent in military orders, this method of cooperation is favored by our partners, who, rather than carrying out deals on a case by case basis, prefer to receive orders ensuring them a large volume of work and allowing their laboratory to continue to function, while developing its potential on a domestic and international level.

The problems which arise are of the same nature as those dealt with above, from the point of view of both the French partner and of his governing body, and are even more acutely felt in this area. It is therefore not easy to come directly to an agreement on such a method of cooperation: Most of the time, in order to get to know one another better, the cooperation will be preceded by the phases described above: invitations to research workers and evaluation of the technologies.

Although most of the initial cooperation efforts supported by the DGA in the CIS belong rather to a hybrid category—a mixture of evaluation, purchase, and joint development of technologies— the many efforts initiated on the theme of future hypersonic vehicles can, however, be put into the latter category.

Initial Assessment

At the initial assessment and without drawing any final conclusions, we can nevertheless confirm that the early results of the initiative are very encouraging. Judge for yourselves: In one and a half years, more than 130 operations have been launched. This figure does not include the projects currently being studied, which involve 51 French firms or laboratories and 72 CIS organizations. The experts from the firms or from the DGA who discovered the laboratories in the CIS have almost always been impressed, as much by the competence of the researchers they have met as by the originality and quality of the results shown to them.

Although surprises may still be expected, the experience accumulated now makes it possible for us to arrive at a better understanding of the areas of excellence of the laboratories in the CIS:

—First and foremost we should mention materials science, particularly metallic materials and welding, monitoring, and shaping processes for which the technologists in the CIS have developed an extraordinary number of variants.

—Another strong point of the institutes is optics and optronics, particularly technologies involving lasers—with which the Russians show astonishing familiarity—or holograms. They are also remarkably skilled in optics for different applications, including space applications.

—Propulsion technologies are particularly well developed, as much for turboprops as for the ramjet engines necessary to the hypersonic vehicles of the future: This latter theme is the subject of several joint operations, involving, in France, the participants in the PREPHA [Research and Technology Program for Advanced Hypersonic Propulsion] program.

—Also anything involving rocket engines and more generally the technologies necessary for the development of space programs; in this field the institutes in the CIS are a real Ali Baba's cave.

—Other sectors have been noted, either by DRET experts or by explorers from French firms, as being very efficient and suitable for cooperation: Surprisingly, this is the case of electronics; not electronics for microcircuitry, although very fine work has been seen in the case of CCD's [charge coupled devices], but power electronics, required in particular by radars. Also robotics, but we knew that the Russians had acquired considerable skill in the field of space robotics. Finally mathematics, pure and applied, a field in which the former Soviets have taken their thinking very far and have obtained remarkable, even staggering results: algorithms several times faster than ours at equal computing speeds.

All these fields are potentially open to cooperation. However, initial difficulties other than those already mentioned must still be overcome. For example, for themes which have a direct military application and which are shown to us without reticence in many laboratories, those in charge nearly always ask, in order to proceed with the deal, for a rider in the form of a government contract. Finally, there is an increased requirement for medium- and even long-term commitment from the partners, who are increasingly aware of the need not to limit themselves to short-lived operations.

The outcome of studies undertaken within the DGA is that we should adapt to this demand and respond in an appropriate manner. We should add that this is in our own interest and that on this point we are in full agreement with our partners when we confirm that we are in no way running a "subsidy" program. [passage omitted describing the return trip from Yurga]

Evaluation Missions in the CIS

In the spring of 1992, two evaluation teams from the DGA went to the CIS in order to analyze the research potential of the former USSR in the fields of optics and optronics on the one hand, and advanced materials, on the other.

The "optics" team visited 17 research institutes whose activities were essentially defense-oriented. Optics is one of the major fields of competence of the CIS, with a research potential considerably greater than is the case in France; overexpansion is the rule. Skill in solid-state physics in the laboratories visited is the basis of their main developments in optics. Most of the possibilities of the Mendeleyev table appear to have been explored and the very broad field of laser materials and architectures has often been tackled

using original approaches compared to Western laboratories. A certain number of strong points or original solutions were thus identified during the mission, but are still to be evaluated in more detail. They concern semiconductors, lasers, nonlinear optics, materials for optics, mirrors and optics, and diffractive optics.

The "advanced materials" team visited 11 research institutes, working mainly for the aeronautics and space fields. There again, the centers are all characterized by their overlarge size and deal with a very great diversity of research. Each of them employs several 1,000 people and most of them do basic research, development, and the perfecting of manufacturing processes. Some establishments—on an industrial scale—appeared disproportionately large for research facilities: The production units, always to be found at independent locations, are faithful reproductions of these establishments; in general, they are also used for training production executives.

A certain number of problems have emerged. Notions of manufacturing costs and of sales price are practically nonexistent in the minds of our contacts, and those of industrial property rights are still very vague. Similarly, although offers were made to the French representatives that research or production be carried out according to their specifications and, above all, that France should contribute to investment, the CIS researchers are still reticent as far as technology transfer is concerned, even where it is a question of supplying precise details of the materials. Finally, in addition to the serious personnel and financial problems with which they are faced, the research institutes visited are suffering from the effects of the splitting up of production between the different republics of the former USSR (supply problems).

The fact still remains that an excellent welcome was given by a very skilled workforce, with enormous R&D potential and open to the idea of cooperation, even if this must very often take the form of a subsidy.

At the time of writing, contact is continuing and some 30 "materials" projects supported by the DRET are currently under way, thanks to special funding from the Defense Ministry.

Breakdown of Technological Cooperation by Technology

1. Structural materials: 26.95 percent
2. Chemistry; energy; propulsion: 2.38 percent
3. Telecommunications and detection: 2.46 percent
4. Optics; optronics: 2.73 percent
5. Fluid mechanics and physics: 7.91 percent
6. Environment; measurements; plasmas: 11.02 percent
7. Data processing; robotics: 13.59 percent
8. Electronic components: 13.79 percent
9. Biology and human sciences: 19.18 percent

France, CIS: French-CIS Cooperation in Mi-38 Helicopter Project Outlined

BR0212093393 Paris L'ARMEMENT in French Jul-Aug 93 pp 82-83

[Article by Andre Martini, assistant to the director of strategy, Eurocopter: "French-Russian Cooperation: The Mi-38 Helicopter"]

[Text] On 18 December 1993 [as published] in Moscow, Eurocopter and the Russian firms Mil, Kazan, and Klimov signed an agreement for the joint development of a heavy-lift helicopter.

Up to now Eurocopter had chosen not to be active in this sector, which requires considerable investment whereas demand is relatively limited. It so happens that helicopters in general, and those of this category in particular, are indispensable to the development of Russia, which has to deal with vast expanses of land and communications networks which are not yet very abundant. The resulting market is therefore sizable. It also happens that Russian production costs have not yet reached those of the Western market. Finally, the experience of Russian manufacturers in producing heavy-weight helicopters is considerable, while Eurocopter can contribute its own experience in modern avionics development. Favorable conditions for cooperation were thus present: technical complementarity; the existence of a market; a competitive product; and goodwill on both sides.

Christened the Mi-38, this new helicopter should be certificated at the end of 1999, its first flight being scheduled for 1995. The predicted market over 10 years has been evaluated at between 300 and 350 machines, more than three-quarters of which will go to the CIS; Eurocopter will be responsible for marketing the helicopter in the rest of the world.

The division of tasks between the partners takes into account the skills on both sides. Mil is thus in charge of the technical side of the program. With 5,000 engineers and technicians, the company can boast of having designed the world's largest helicopter: the Mi-26, which is able to take 20 metric tons in its cargo compartment over 1,000 kilometers. The technical approach chosen by Mil aims at making the Mi-38 a significantly more efficient helicopter than the current generations in the essential fields of safety, running costs, and performance. Its "productivity" as a mode of transportation should thus be excellent. The helicopter, able to fly in temperatures between -60 and +50 degrees Celsius, will be able to carry 3,500 kg over 800 km at 290 km/h with a total weight of nearly 15 metric tons. It will be equipped with a six-bladed rotor in an ice-free composite material, a fuselage which has a rear access ramp, and passenger comfort will be comparable to that of a commercial aircraft.

The Klimov company has been put in charge of developing the 2,100 HP [horsepower] turbines which will fly the Mi-38. These are twin-stage free-turbine turboshaft engines

equipped with an electronic regulation system, with an estimated specific fuel consumption of 235 g/HP x h.

The Kazan company will be responsible for the industrialization and production of the helicopter parts developed by Mil, as well as for the marketing of the helicopters built for use in the CIS.

Eurocopter's contribution to the development of the helicopter will mainly be in the field of the man/machine interface and through the advice and information given to the Russian manufacturers with a view to facilitating the Western certification of the helicopter, which will conform to the regulations in force.

The Mi-38's cockpit will be equipped with six screens, four to control the machine and two intended for managing the radio and the navigation system. The crew's workload will thus be greatly reduced. The automatic pilot, which is to be developed by Eurocopter, will offer a performance level corresponding to Western standards.

In order to successfully carry out this cooperation, in which the equipment manufacturers SFIM [Measurement Instruments Manufacturing Company] and Sextant Avionique are taking part, a joint venture company set up under Russian law will be formed at the end of 1993. Its job will be to organize contacts between the partners and to see the various certifications through to a successful conclusion.

An original alliance will thus be formed between Eurocopter and three world-famous Russian companies. During the period which preceded the signing of the contract, a climate of confidence and reciprocal esteem grew up very quickly. This augurs well for the success of this undertaking.

France, CIS: Expediency of Space Cooperation Questioned

BR0212094793 Paris L'ARMEMENT in French Jul-Aug 93 pp 77-81

[Article by Xavier Quin, engineer graduated at "Ecole des Mines," deputy chief of the Space-Satellites Group within the Missiles and Space Directorate: "Cooperation With the Russians in the Space Field"]

[Text] During the summer of 1992, the ANTARES mission, and notably French astronaut Michel Tognini's flight on board the MIR space station (footnote 1)(the participation in the Altair mission in July 1993 of Frenchman Jean-Pierre Haignere is the most recent example to be added to the previous operations) reminded the French public that French-Russian cooperation in the field of civil space was indeed a reality. We all also remember that the first French astronaut, Jean-Loup Chretien, flew on a Soviet vessel at the beginning of the eighties. However, it is certainly less well known that the GRANAT space probe for the study of x-rays or the VEGA 1 and VEGA 2 probes to study Halley's Comet and Venus were also developed in cooperation with the former USSR.

This cooperation is expected to continue because the CNES [French National Space Study Center] and its Russian counterpart signed a contract last summer for several French astronauts to take part in flights on Russian space vessels between now and the end of the century. In other respects, at the last two conferences of the European Space Agency in Munich and Granada, ministers meeting at Council of Ministers level decided that they wanted cooperation with CIS (Commonwealth of Independent States] countries to be strengthened, especially within the context of studies on the future European space shuttle.

In the field of military space, as in the military field in general, the level of collaboration between France and Russia is far from being as well developed as in civil space, for obvious reasons. France would cooperate more willingly with WEU [Western European Union] or NATO countries.

It is true that military satellites appeared fairly late in France's range of weaponry. However, this should be kept in perspective vis-a-vis nearly all the other European countries. The progress made by our space industry in the civil sector, which is often perceived by our partners as the source of our superiority complex, has often led us to envy the space potential of the two superpowers rather than that of other countries. Unfortunately, exchanges in the military space field with the two superpowers have remained practically non-existent for a long time. Military space observation and monitoring programs involve intelligence and are therefore blacklisted by the United States and have been excluded for possible cooperation projects. Some other military space projects have been the object of a French-American cooperation agreement, signed in January 1993. Relations with the Soviets have not been developed for much the same reasons.

The situation has not changed very much since the collapse of the Eastern Bloc and successive missions are now taking place by representatives of industry and government from all countries to assess the scientific potential of the former USSR and to study cooperation possibilities. The space sector, a field of predilection for the CIS, has been particularly popular among Western experts.

Different Concept of Space

It might be useful to provide further information about the space sector in the countries of the former USSR.

In 1991, 59 out of 87 successful launches in the world were of Soviet origin. In other words, two out of three launches originated from the former USSR. By comparison, the United States carried out 18 launches during the same period and the European Space Agency a mere eight. The number of launches carried out by the ex-USSR that year was the lowest for 20 years. At the

beginning of the eighties, the annual number of Soviet launches totaled about 100 and this was still near 90 in 1986.

However, the lifespan of Soviet satellites is often much shorter than their Western counterparts, even though much progress has been made. The most outrageous examples of this are the photographic reconnaissance satellites Resurs F1 and Resurs F2, which were used for the preparation of the agricultural reform plan in Russia. The lifespan of these satellites was respectively 16 and 30 days. In comparison, SPOT 1, the civil observation satellite developed by the CNES, continues to provide images seven years after its launch. The short lifespan of Russian satellites is not a problem of reliability but the very design of the system which includes controlled landing of capsules to recuperate the photographic films taken by the satellites. It is therefore easily understandable that this kind of satellite design requires many more launches.

The large number of launches per year compensated by the short lifespan of satellites justify the statement by Yuriy Koptev, director general of the RKA [Russian Space Agency], that CIS countries have between 140 and 170 satellites in orbit permanently.

CIS launchers are different not only in number but also because of their huge load capacity. The Proton launcher, for example, can send a 15-tonne load into low orbit, while Ariane 44L, the most powerful version of Ariane IV, can lift no more than seven tonnes. Weight restrictions have therefore proved to be less critical for Soviet satellite development programs than for European satellites. The mass of the civil radar observation satellite Almaz is estimated at around 20 tonnes. As for the Buran shuttle, it is nearer in size to the American shuttle than to that of Hermes.

The testing facilities are in proportion to this. The NPO Lavroshkin company has a 54.000-cubic-meter anechoic chamber and the Niikhimash center has a thermal altitude chamber with a 10.000-cubic-meter capacity and can hold nearly the whole of the Buran shuttle (except the nose).

This immensity is mirrored in industry. The number of people working in the Russian aerospace sector is estimated at approximately 600.000. The space industry is also extremely well integrated with companies capable of making a range of products from onboard computers to magnetic space recorders to focal planes for observation satellites and even active antennae. In France, these materials are made by different manufacturers.

The space sector is certainly more banal than in Europe to the extent that the standards of cleanliness in force in Western countries must seem extremely rigorous to Russian manufacturers. French experts visited an assembly workshop for satellite propulsion modules without having to don protective footwear or even to go through an airlock. The assembly workshop opened directly on to a corridor which in turn opened directly outdoors. The French experts expressed their concern at the lack precautions to control cleanliness in the workshop. The Russians, somewhat annoyed, showed them an instrument used for measuring the cleanliness of the hall. The needle of this instrument invariably indicated "zero."

For many years, former Soviet Union countries were subject to COCOM export regulations and therefore did not avail of the high-performance computers developed in the United States and Japan which they were unable to manufacture for themselves. This led them to taking greater care in their calculation algorithms to compensate for the mediocre performance of the machines used.

Even though CIS countries are somewhat behind in electronics and especially in computer sciences, they are very much ahead in the field of welding materials and processes. Shape-retaining materials are currently used for locking the large structures used in space.

Changing Mentality

The development of space programs in the former USSR responded, for many years, to a strong political will to conquer space and demonstrate the supremacy of the Soviet world. We all remember the impressive means used in the sixties by both the United States and the Soviet Union to be the first to walk on the moon. Museums in NPO Energiya and NPO Lavroshkin testify to this heroic period (cosmonauts of the time were actually called "national heroes"). The ends justified the considerable means allocated to the space sector.

During the same period, the thrust to produce was far greater than the thrust to sell. This is still evident in Russia today. Russians still have difficulty apprehending the added value represented by an efficient distribution network.

The excruciating passage from a centrally planned economy to a market economy and the serious budgetary difficulties encountered by Russia has led little by little to a change in mentality. It has now become urgent to assess the cost-effectiveness of space programs and to prioritize. The budget granted to these programs cannot keep increasing indefinitely.

The budget allocated to the RKA for civil space programs for 1992 was 10 billion rubles at the beginning of the year. At the current rate of exchange (one French franc was worth 80 rubles on 1 January 1993) and in view of the low wage levels—the average monthly salary for a researcher was around 8,000 rubles on 1 January 1993—and galloping inflation in Russia, this amount is insignificant. One thing for sure is that the annual budget devoted to civil space programs is not large and this budget is insufficient to ensure the survival of all laboratories and the preservation of all existing skills.

Many Projects Deadlocked

However, there is no lack of projects and the imagination of Russian researchers seems to know no limit. But these projects are often moving at a sluggish pace or have even ground to a halt completely for lack of funding. Among the civil projects mentioned by the Russians are the following:

—The Energiya rocket and Buran shuttle, a near exact copy of the American space shuttle; the Russians have found new uses for their shuttles such as putting long-life nuclear waste into orbit, placing large mirrors in space to provide the Earth with light, cleaning up the geostationary orbit, or the restoration of the ozone layer. The Energiya rocket could, in the long term, replace the Proton launchers whose propellers are reputed to be highly toxic;

—The Courier system, a competitor of the Iridium project of the American Motorola company. This communications system incorporates 60 satellites weighing one tonne each;

—The Freight multipurpose platform. The START [Strategic Arms Reduction] Treaty provided for the destruction of a large number of SS-18 launchers. The platform could be an elegant solution to this problem because it would allow SS-18 missiles to be used as satellite launchers after a certain number of adaptations (and notably the preliminary removal of nuclear warheads). The payload carried aboard could be used for ecological purposes;

—The Bankir system: This system would include three geostationary satellites and would be used for interbank telecommunications;

—The Pilot system: This system would include three geostationary satellites and four satellites on inclined elliptical orbits which could ensure air traffic control, including in the polar regions;

- The Hopa project: With four satellites on inclined elliptical orbits, this system would enable communication between high-latitude regions in Russia, Europe, and America.

The effective completion of most of these projects is conditional to the setting up of cooperation and obtaining funding from third countries.

Should We Cooperate with Russia?

The opening up of the former Soviet states has clearly revealed the amazing available technological potential in the CIS, especially in the space field. It has become increasingly obvious that this potential is under threat by the difficult transition from a centrally planned economy to a market economy with the ensuing rationalization of the current system. Failing cooperation with other Western countries, this unique treasure of scientific knowledge risks, like Atlantis, disappearing forever or otherwise being dispelled in highly undesirable countries.

In view of the ruble's current exchange rate and ensuing Russian labor costs, it is obvious that ready-made equipment can be purchased at highly competitive rates. The AIR ET COSMOS magazine announced in one of its January 1993 issues that the cost price for a Proton launcher was some 100 times less than for an Ariane launcher.

Similarly, it is possible to commission studies or hire researchers to work for very reasonable rates, which, in many respects, is certainly beneficial for our industry.

Finally, cooperation with the Russians, like all forms of cooperation, enables privileged links to be established with CIS manufacturers and encourages cooperation rather than competition.

Conversely, several arguments give rise to a certain caution in setting up cooperation with Russian industry.

It is clear that because of their high technical value and particularly low prices, Russian products are particularly attractive to Western organizations concerned with getting value for money and only thinking in the short term. The Russian manufacturers we think we are supporting today through what could be considered as "humanitarian aid" often seem to become competitors who will invade our markets in the near future. Every product purchased from the CIS allows an industry to survive which may soon, if it is not already the case, be in direct competition with our own industry.

In this respect, the sums of money allocated by France to technological cooperation with the CIS may be viewed jealously by our own manufacturers at a time when budgets for the arms industry are being cut across the board and when job losses are regularly announced.

Furthermore, the small number of contracts with Western manufacturers are not enough to put a halt to Russia's brain drain or to refrain the countries of the former Soviet Union from being at the origin, without discrimination, of proliferation. Also, the attitude we adopt toward the CIS countries will be closely observed by the countries we cooperate with on a regular basis. Will eventual cooperation between France and Russia be considered as an example to follow or, in a more negative light, as a means of pressure used by France to play the competition game and to negotiate effectively with the United States or with other European countries?

Finally, cooperating in top-secret areas and the possibility of accepting exchanges of information on sensitive issues with a country which up until recently was not "in our camp" should inevitably be the object of previous in-depth reflection by us.

These are some of the pitfalls to watch for if cooperation with the Russians is desired with a view to improving our own competitiveness regarding our traditional competitors.

EUROPE-ASIA RELATIONS

Germany, PRC: Siemens To Install Two GSM Systems in China

BR0712095293 Chichester INTERNATIONAL TELECOMMUNICATIONS INTELLIGENCE in English 1 Nov 93 p 13

[Unattributed article: "China-Siemens To Install Two GSM Systems"]

[Text] Siemens Shanghai Mobile Communications Ltd. (SSMC), has received two turnkey contracts to install GSM [Global System for Mobile Communications] digital mobile phone systems in China. SSMC is owned 60 percent by Siemens and was formed last March for the production, sale, installation and servicing of digital mobile communications equipment in China.

The first contract, worth 14 million German marks [DM], was awarded by Guangdong Mobile Communications Corporation and comprises the supply of 10 base stations and one exchange. The network will have an initial capacity for 15,000 GSM subscribers and is scheduled to enter operation in Shenzhen in the Spring of 1994.

The second contract was placed by the state-owned network operator Shanghai Post and Telecommunications Administration (PTA) and is worth about DM17 million. The network will cover the Shanghai-New Pudong area and be designed for 10,000 subscribers initially. It will comprise 13 base stations and one exchange and is due to enter service from December 1993.

Earlier this year, Guangdong Mobile Communications ordered a GSM system from Ericsson which is being installed in the Pearl River Delta region in southern China. This is thought to be the first GSM system to be put into commercial operation in China.

China's Ministry of Posts and Telecommunications is also considering adopting the US CDMA [Code-Division Multiple Access] technology in addition to GSM as the basis for future digital cellular phone services in the country.

Foreign Broadcast Information Service (FBIS) and Joint Publications Research Service (JPRS) publications contain political, military, economic, environmental, and sociological news, commentary, and other information, as well as scientific and technical data and reports. All information has been obtained from foreign radio and television broadcasts, news agency transmissions, newspapers, books, and periodicals. Items generally are processed from the first or best available sources. It should not be inferred that they have been disseminated only in the medium, in the language, or to the area indicated. Items from foreign language sources are translated; those from English-language sources are transcribed. Except for excluding certain diacritics, FBIS renders personal names and place-names in accordance with the romanization systems approved for U.S. Government publications by the U.S. Board of Geographic Names.

Headlines, editorial reports, and material enclosed in brackets [ ] are supplied by FBIS/JPRS. Processing indicators such as [Text] or [Excerpts] in the first line of each item indicate how the information was processed from the original. Unfamiliar names rendered phonetically are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear from the original source but have been supplied as appropriate to the context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by the source. Passages in boldface or italics are as published.

SUBSCRIPTION/PROCUREMENT INFORMATION

The FBIS DAILY REPORT contains current news and information and is published Monday through Friday in eight volumes: China, East Europe, Central Eurasia, East Asia, Near East & South Asia, Sub-Saharan Africa, Latin America, and West Europe. Supplements to the DAILY REPORTs may also be available periodically and will be distributed to regular DAILY REPORT subscribers. JPRS publications, which include approximately 50 regional, worldwide, and topical reports, generally contain less time-sensitive information and are published periodically.

Current DAILY REPORTs and JPRS publications are listed in *Government Reports Announcements* issued semimonthly by the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia 22161 and the *Monthly Catalog of U.S. Government Publications* issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

The public may subscribe to either hardcover or microfiche versions of the DAILY REPORTs and JPRS publications through NTIS at the above address or by calling (703) 487-4630. Subscription rates will be provided by NTIS upon request. Subscriptions are available outside the United States from NTIS or appointed foreign dealers. New subscribers should expect a 30-day delay in receipt of the first issue.

U.S. Government offices may obtain subscriptions to the DAILY REPORTs or JPRS publications (hardcover or microfiche) at no charge through their sponsoring organizations. For additional information or assistance, call FBIS, (202) 338-6735,or write to P.O. Box 2604, Washington, D.C. 20013. Department of Defense consumers are required to submit requests through appropriate command validation channels to DIA, RTS-2C, Washington, D.C. 20301. (Telephone: (202) 373-3771, Autovon: 243-3771.)

Back issues or single copies of the DAILY REPORTs and JPRS publications are not available. Both the DAILY REPORTs and the JPRS publications are on file for public reference at the Library of Congress and at many Federal Depository Libraries. Reference copies may also be seen at many public and university libraries throughout the United States.

END OF FICHE

DATE FILMED

22 JAN 94